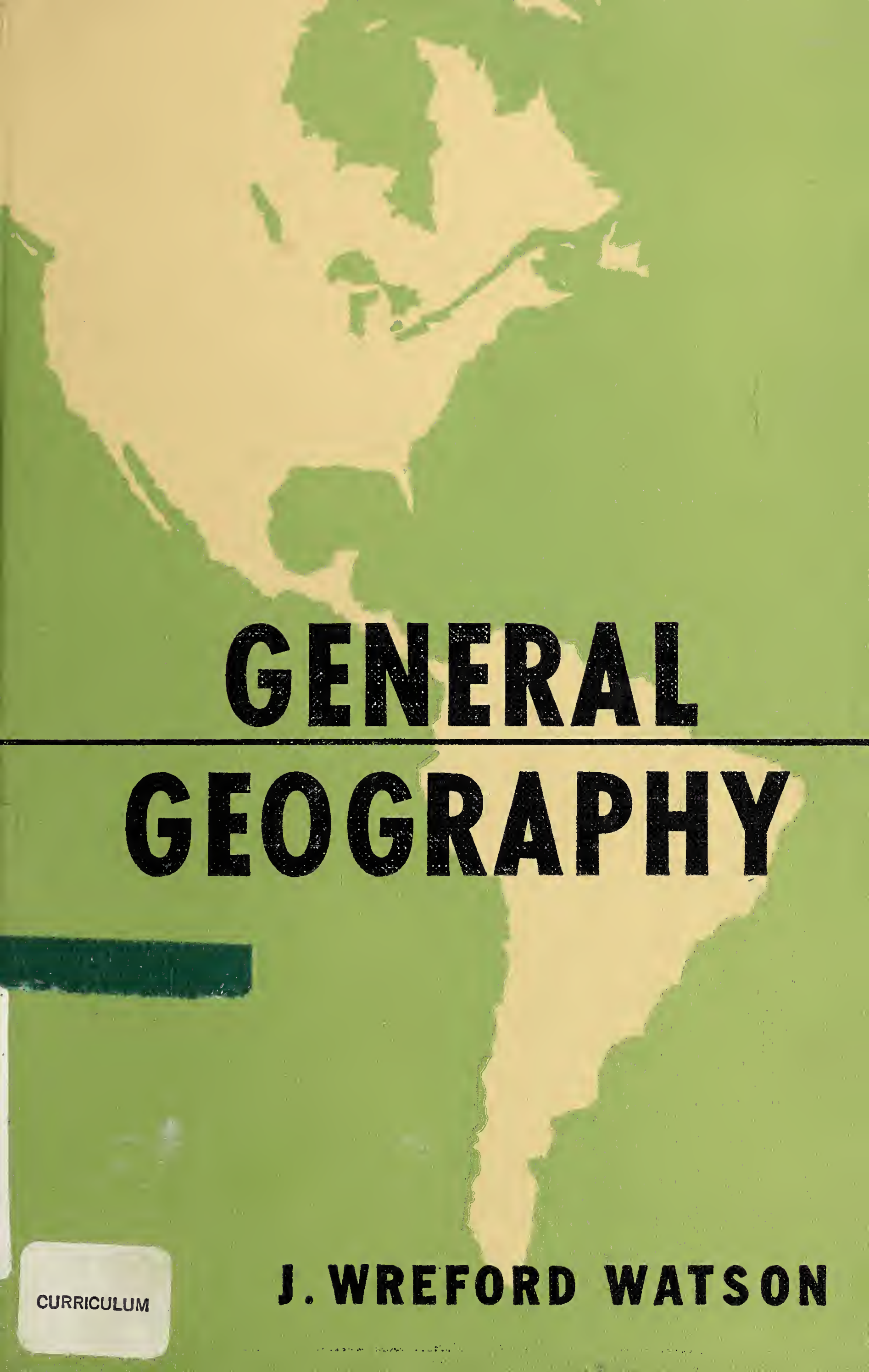

GENERAL GEOGRAPHY

J. WREFORD WATSON

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GENERAL GEOGRAPHY

General Geography

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THE COPP CLARK PUBLISHING CO. LIMITED
VANCOUVER TORONTO MONTREAL

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Reprinted 1958, 1959

Edition authorized for Alberta Schools, 1961

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Preface

Geography has influenced the development of few countries more than that of Canada. Consequently the study of geography is of growing interest both at school and university. Nevertheless, there is a lack of Canadian texts in geography. Few of the books about the subject have provided Canadian examples in connection with the topics or regions discussed.

The present work tries to remedy this situation by describing the elements of geography mainly in terms of the Canadian landscape, wherever this is appropriate.

The author has outlined these elements for high school or college students presumed not to have had much previous knowledge of the subject. In this special abridged edition, the emphasis has been laid upon the economic and social geography of the country. While there is a certain unavoidable tendency to add one fact to another it should be pointed out that geography is not simply an exercise in additive description, but rather one in integrative depiction, and the stress is laid on how one factor influences another in a whole unity of reactions extending from rocks and trees to man and his works. The world distribution of each factor is set forth, and then the Canadian example is given.

Drawing upon his teaching experience at McMaster University and at Carleton College, and upon his travels throughout the length and breadth of Canada when he was the country's Chief Geographer, the author has attempted to portray, not only what is included in the pursuit of geography today, but also something of the extraordinary bounty and beauty of the Canadian environment. He will have been well repaid if his efforts serve to inspire others to explore and love their country more and if material is thereby gathered from which a better geography may be constructed.

Special acknowledgements are made to the author's wife, herself a geographer, who contributed many helpful suggestions; to Miss Kroger and Miss Guzewska who assisted in preparing new maps, and to Miss Ettinger and Mr. McMaster for their editorial criticisms and help which proved invaluable.

J. W. Watson

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INTRODUCTION

The Field of Geography

Geography. Derived from the Greek words *ge*, the earth, and *graphein*, to write, the word "geography" means a description of the earth. Anything which gives a word-picture of the earth is in some sense geographical. Accordingly, there is much good geography in poetry, novels, and travel stories. It would be difficult, for example, to describe the winter climate of the Ottawa Valley better than is done in Lampman's "A January Morning",

> The glittering roofs are still with frost; each worn
> Black chimney builds into the quiet sky
> Its curling pile to crumble silently . . .

But custom excludes these poetic pictures and restricts geography to a scientific description of the land or climate, the occupations or people of a place, or other related things.

Geography is chiefly interested in the problems of space. It answers the basic questions Where? Why there? Anywhere else? It tries to find out the geographical location and limits of things on the earth and to suggest explanations for them. It looks for patterns that have length and breadth, at different heights and depths, and describes the earth in their terms. (See Fig. 0·1, page 2.)

As it does so, it finds that all countries are conditioned, to some extent, by these patterns. This is true of few countries more than of Canada. The development of the fisheries, the fur trade, mining, agriculture, and lumbering has closely followed the geographical pattern of resources. Transportation has as closely followed the form of the land, and so has the concentration of industry and population.

This being the case, the study of geography should show: (i) where, to what extent, and in what ways, geographical distributions limit or provide opportunities for development and settlement; (ii) how and where settlement and the use of resources may be better adjusted to geography.

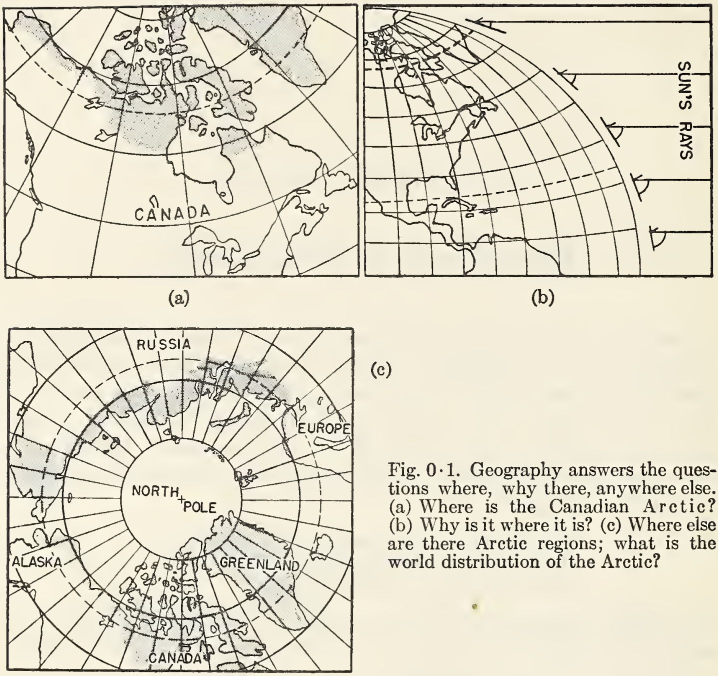


Fig. 0·1. Geography answers the questions where, why there, anywhere else. (a) Where is the Canadian Arctic? (b) Why is it where it is? (c) Where else are there Arctic regions; what is the world distribution of the Arctic?

HISTORICAL BACKGROUND

During the period of ancient history, geographical activity was very pronounced in Egypt, Greece, Rome, India, and China. During the dark ages it lapsed in Europe, although it continued elsewhere—especially among the Arabs, who were the great geographers of that period. The European monks, of course, attempted to systematize their knowledge of the earth, but since they often relied on deduction rather than observation, their descriptions were sometimes unrealistic.

The Renaissance led to a new thirst for knowledge about the earth; the countries of southern Europe, blocked from the East by the Turks, launched out upon the Atlantic, rounded Africa, discovered the Americas, and started all of western Europe on a course of unprecedented exploration and expansion. Geographical knowledge increased by leaps and bounds.

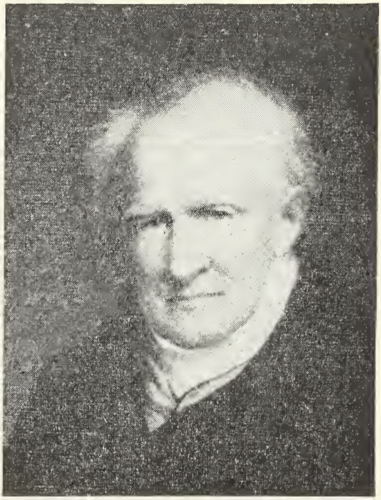
The Industrial Revolution and the modern era of extensive international trade have made geography so important that even the ordinary citizen of today must know something about his country, where it exports its products to, where it draws its raw materials from, and what its relations are with other countries all over the world.

Kinds of Geography. At first geography was largely *descriptive.* It was a "capes and bays" geography, which described each physical feature, the coast, the rivers, the principal mountains, together with the main settlements and their industries. People studied the names and the locations of capitals of countries and counties; they learned long lists of the products of different countries, who the inhabitants were, what language they spoke, or what food they ate; but no attempt was made to answer why these things occurred where they did. In Chaucer's time, geography consisted of learning

> Alle the havenes, as they were
> From Gootland to the Cape of Fynestere,
> And every cryke in Britaigne and in Spayne.

In the eighteenth century, however, men went a stage further and tried to explain why things were where they were, why coasts had the form they had or why mountains ran where they did, why certain things were produced in one area and not in another, why certain sites were chosen for capital cities and why the life of the people there was what it was. Geography became an *explanatory* subject, to explain how the geographical patterns of population, settlement, production, climate, and landform developed in relation to their environment. (See Fig. 0·2.)

Actually, some geographers went too far and, in their desire to explain these things according to geography, apparently gave the idea that geography controlled them. They were thus responsible for the theory known as **geographical determinism.** But geography does not determine life so much as influence it. Life can change the geography of any area—as man has done by replacing certain plants and animals with others,



American Philosophical Society

Fig. 0·2. Humboldt, father of modern geography, began the revival in the subject which made it not only a descriptive art but also an explanatory science. (After a painting by J. R. Lambdin.)

by changing the course of rivers, by eroding the soil, and by irrigating the desert. Thus while man frequently adapts himself to nature, he also adapts nature to his needs. Modern geography is a study of this interaction between nature and man as it affects the landscape of the earth.

SUBDIVISIONS OF GEOGRAPHY

Geography is a study of a great many factors. These include natural ones such as distance and altitude, landform and climate, soil, vegetation, and animal life. They include, too, the distribution of race, language and religion, occupation, transport and trade, health and population. Geography shows how one place differs from another because of the different way in which these factors are related to each other and by examining place after place, builds up a picture of the earth as a whole. (See Fig. 0·3.)

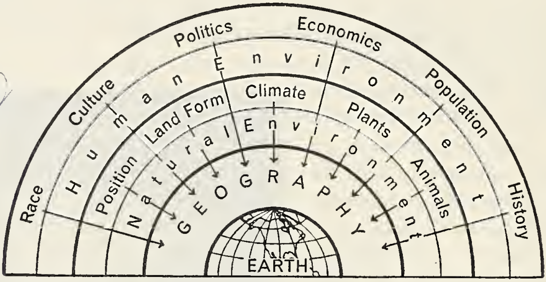


Fig. 0·3. Geography in relation to natural and human factors.

But geography is not a haphazard collection of factors, for they work in such close dependence upon each other that there is an observable chain of reactions going on between them. This series of reactions follows a regular succession called the **geographical succession.** First there is the place of the earth in the universe, its structure, size, and shape. Since it affects later things such as climate, flora, agriculture, health, and population, it must come first in the geographical description of any area.

Next in the succession come the structure of that area and its bedrock. They influence landform, climate, occupation, and settlement. The climate, which itself is controlled by the earth as a planet and by landform, in its turn controls vegetation and affects soil. Finally, natural vegetation and wildlife, which have grown up in reaction to soil, climate, and landform, are the basis of agriculture and of much industry.

The geographical succession continues with a description of how man has used his resources; that is, of the chief human occupations like hunting and fishing, herding and farming, carrying and trading, mining and manufacturing. These, in their turn, influence the forms of human settlement, including camps, villages, and cities. Settlement may also be influenced by the geographical distribution of race, nationality, language, and religion. All these factors are summed up in the population, its health and vitality, its composition and trends.

Because of this great succession of things that have to be described, geography subdivides itself into several large and many minor divisions. These are:

A. Physical Geography
  1. mathematical geography—The earth as a planet, its relation to the sun; its size and shape; latitude and longitude; projections and scales.
  2. geomorphology—Bedrock and build; landforms—riverine, lacustrine, glacial, aeolian.
  3. climatology—Weather and climate.
  4. bio-geography—Types and distributions of plants and animals.

B. Human Geography
  1. economic geography—Occupation and communication—primary production, secondary production, transportation, and trade.
  2. cultural geography—Race, language, religion, and nationality.
  3. social and political geography—Settlements and population; national development; frontiers.

THE GEOGRAPHER

The term geographer is quite old. In 1777 the United States of America appointed its first geographer, Robert Erskine. It was his duty to explore the country and make maps of its major regions. In 1890 Canada appointed its first geographer, Mr. John Johnston, whose duties were to make maps and atlases of the country.

Geographers have always been map-makers and, although map-making has now become so highly specialized that it is primarily the work of the cartographer, yet geographers still find a useful place in mapping institutions or departments in Britain and elsewhere in Europe. In the United States, the term carto-geographer is frequently used of those geographers who are employed in making maps.

Usually such geographers find their special opportunity in compiling "geographical" rather than "topographical" maps; in other words, in mapping geographical distributions on small-scale maps. They do not take the place of the topographic engineer who prepares large-scale maps.

However, the duties of a geographer today go far beyond exploring and map-making. Geographers are employed by municipal governments to assist with **town planning**, by provincial governments to aid in **regional planning** and the making of land-use surveys, and by the federal government to render the services indicated in the following advertisement:

> The Public Service of Canada Requires
> Geographers, Grade 8
>
> DUTIES
>
> Under general direction to plan and direct research and field studies on the geography of Canada and of other areas of significance to this country; to assemble and interpret information on the physiography, climate, and other factors of the physical environment and to coordinate it with the economic, commercial, and other aspects of the geography of the country.

In other words, the geographer must make field surveys of, and compile reports on, the geography of resources and their use, together with their effect on development and settlement throughout the nation. Geographers also do important work for the federal government on aspects of **defence research.**

Outside of mapping institutions and government service, geographers find their chief opportunities in university and high school teaching. Recently, however, business and industry have begun to take an interest in geography. Numerous concerns employ geographers on **industrial location**, to help make surveys for the location of new plants. Similarly, firms that make surveys of the industrial and business potential of any community or region are now employing geographers. Several international aerial survey corporations employ geographers to interpret and produce recommendations from aerial surveys, field studies, and expeditions covering developed and undeveloped areas of the world; for example, Pakistan, Iran, Ceylon, and Antarctica.

In all these varied capacities, the work of the geographer is essentially the same; it is to show how land use, settlement, and the social and economic activities of man are adapted to the physical environment. His studies should help towards a better understanding of the environment, and, therefore, a better use of it.

QUESTIONS

A

1. What is the distribution of the natural grasslands or prairies of Canada?
2. Why are these where they are?
3. Where else do temperate grasslands occur?
4. What other types of grassland are there, and where do they exist?
5. What are the basic geographical conditions responsible for grasslands?
6. What uses have Canadians made of the prairies?
7. What have other people done with their grasslands?

B

8. Do all grasslands produce the same economic activities?
9. To what extent may it be said that grasslands determine the uses to which man has put them?

C

10. Give examples where geography has appeared to determine or has failed to determine human response.

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CHAPTER I

The Position of a Place

The Importance of Position. The geographical position of a place is one of the most important facts about it. When buying a house, people usually pay a great deal of attention to its location. Some want a downtown place, near their work, the shops, and the theatres; others prefer a place in the suburbs; in either case, their choice is affected by location.

Often the location of a business determines its success. Exclusive shops may be established in somewhat remote locations so as to set people of means apart from the ordinary shoppers. But a business that depends on many sales to casually passing people must be located where traffic is thickest, at converging street-car routes where the passengers are dispelled into the streets, at points where it is convenient for people living in different areas to meet and shop together, where it is fashionable to stroll up and down, or where other attractions such as restaurants and theatres draw folk together. And in the larger centres, adequate parking space is now so important to the success of a business that a decentralization of shopping areas is taking place.

Every factory owner knows how extremely important it is to find the right site for his plant. Ideally, it should be located close to the raw materials which he uses, near the sources of power to run his machinery, and easily accessible to the customers who are going to buy his products. This happy combination seldom occurs. Usually, the owner has to decide which one of these several factors will prove most advantageous. If it is cheaper to bring the raw material to where the power lies than to develop power where the raw materials are, he will choose the site with available power.

On a larger scale, some cities are more successful than others because they are more favourably located. They are more accessible to more businesses and people than other cities, and so they forge ahead. By comparison, the places that are isolated fall behind. In 1788 Niagara-on-the-Lake was the capital of Ontario, but people soon found that it was too close to the frontier and that Toronto (or York, as it was then called) was located closer to the bulk of settlement, possessed a valuable harbour, and was situated at the start of the Indian trail, or portage leading northwards to the Huron streams. Consequently the capital was moved to Toronto in 1793. Today Toronto is many, many times larger than Niagara-on-the-Lake.

What is true of cities also applies to countries. Some countries are more fortunately situated than others, for some are at the cross-roads of natural routeways while others are inaccessible and out of the way. Egypt and Palestine, Greece and Rome rose to power early and have continued to have importance—often far beyond what might be expected in view of their scanty natural resources—mainly because their peoples took advantage of their position at the meeting place of Asia, Europe, and Africa, and of the Indian and Atlantic Oceans (through the Red Sea and the Mediterranean Sea).

With the rise of western Europe, the North Atlantic became important; and North America, brought into active contact with civilization, soon moved ahead. Canada's position—commanding the shortest passage of the Atlantic between the mainland of North America and the European continent—was bound to be important. The way in which the French and English struggled so fiercely for the country was evidence of that importance.

Today the position of Canada is still more significant because not only the lands around the North Atlantic, but also those around the North Pacific are active in trade and industry. Canada is midway between them. Looking east or west, she faces lands teeming with millions of people who can supply her with many products and who are in great need of her wheat and lumber, her fish and furs, her metals and her machines.

THE EARTH'S POSITION IN THE HEAVENS

Geographical position depends on many things—the build of the continents and oceans, and the size and shape of the earth—but these are known only as they have been measured. Their measurement and that of the position of any place with respect to them depends, in turn, on the earth's relation to the sun and to other heavenly bodies.

This is one of the oldest of human problems and was one of the first faced by geographers. It is not surprising to discover, therefore, that in the geography book written by Ptolemy in the second century (one of the first of its kind), the chief concern was with position on the earth and the relation of the earth to the solar system.

This relationship is fundamental to geography. Everything else depends on it. It allows geographers to state position and to measure the geographical distribution of things over the earth.

The Solar System. Stars, planets, planetoids or asteroids, comets and meteors are the chief celestial bodies. Many of them are grouped together; for instance, the sun (a star) has nine bodies like the earth (a planet) wheeling around it, together with several comets and hundreds of planetoids. The whole grouping is known as the Solar System. (See Fig. 1·1.)

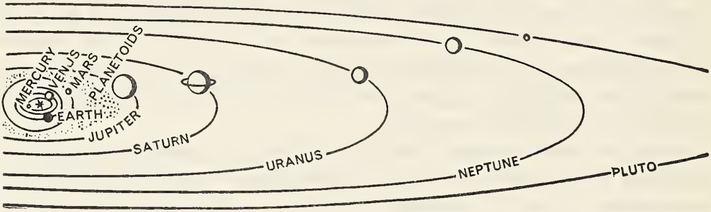

Fig. 1·1. The earth in the solar system. This gives an idea of the order of the planets, their size, and their distance from the sun. However, no attempt is made to show the sun in proportion, though its position is indicated.

It is thought that the planets were derived from the sun, possibly when a neighbouring star came near enough to the sun to exert sufficient pull upon it to draw out streams of material which then coalesced into balls of matter and circled the sun, held to their course by its compelling attraction.

The planets differ in size and are irregularly spaced. **Mercury,** the smallest of the planets, with a diameter of 3,100 miles, is nearest the sun, at a distance of about 36 million miles. **Venus,** 7,700 miles in diameter, is 67 million miles from the sun. The **Earth,** 7,927 miles in diameter, is 93 million miles away from the sun. **Mars,** with a moderate diameter of 4,200 miles, is 142 million miles away.*

Beyond Mars are many planetoids or asteroids and then, far out, lies **Jupiter.** An immense planet with a diameter of 88,800 miles, it is 484 million miles from the sun. **Saturn,** with a diameter of 75,100 miles lies 887 million miles out. Beyond it, **Uranus,** another large planet, with a diameter of 31,000 miles, is 1,785 million miles from the sun. **Neptune,** with a diameter of 33,000 miles, is 2,797 million miles out, and on the outermost rim of the Solar System lies **Pluto,** 3,670 miles in diameter, and 3,670 million miles from the sun.*

---

*Figures to nearest whole number. Equatorial diameters are given.

Most of the planets have **moons** circling about them. The earth has one, Neptune two, Mars two, Uranus five, Jupiter twelve, and Saturn nine. Some of these moons have been only recently discovered. Jupiter's tenth and eleventh moons were sighted in 1938, and in 1951 Dr. Nicholson of the Mount Palomar Observatory announced the discovery of Jupiter's twelfth moon.

This whole system of inner planets, asteroids, outer planets, and attendant comets, wheels about the sun in the immensities of the heavens. Beyond are vast expanses of space to the other stars and starry groups. Some of these are surrounded by their planets; some are double stars circling round each other; some are star clusters which are extremely remote universes of their own and appear in the sky as clouds of brightness. There are also giant masses of incandescent gases called nebulae. All make patterns in the sky—the geography of the heavens—which help man to locate himself.

Geographical Direction. There is, for example, a star known as Polaris, or the North Star, that stays more or less above the North Pole. It is easily recognized, since the last two stars of the star group known as the Big Dipper point to it. For many generations, then, this has helped man to determine north direction (See Fig. 1·2.). Similarly, in the Southern Hemisphere the constellation of the Southern Cross helps to fix the direction of south.

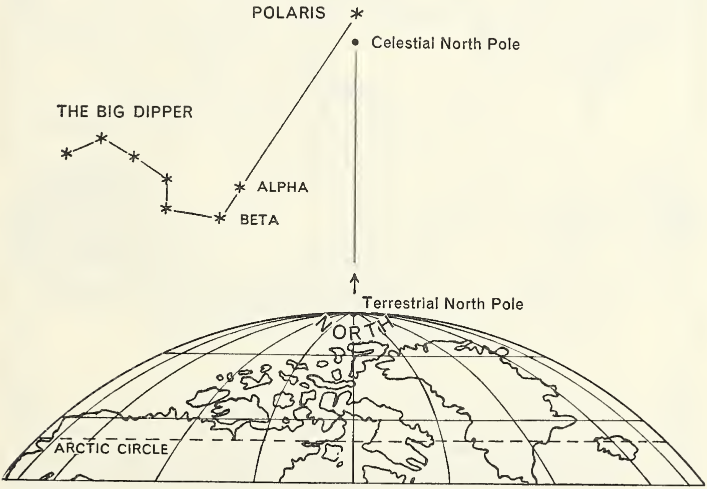

Fig. 1·2. Fixing direction north is done by the use of the Big Dipper, the last two stars of which point to the North Star, or Polaris.

Directions east and west are established by the rising and setting of the sun. For a very long time it was thought that the sun circled the earth. This, of course, was an illusion; the earth circles the sun, but as it does so it rotates on its own axis. Thus part of the earth is turning towards the sun and part of it away from the sun each hour.

TIME AND SEASONS

The rotation of the earth is completed in 23 hours 56 minutes and 4 seconds—roughly 24 hours. Since the earth is round, this means that it rotates through a circle of 360° in 24 hours, or through 15° in 1 hour, or 1° in 4 minutes. This enables man to calculate time and to divide the earth into time belts. If two places are 15° apart, they are 1 hour apart in time.

Time Belts. Actually time changes gradually mile by mile as the earth rotates, but to save people living a few miles apart the inconvenience of setting their clocks to a slightly different noon, and, therefore, keeping slightly different time, the world has been divided into **time belts.** Greenwich, England, is the place from which time is measured all over the world When it is noon at Greenwich, it is one o'clock in the afternoon 15° east of Greenwich and eleven o'clock in the morning 15° west of

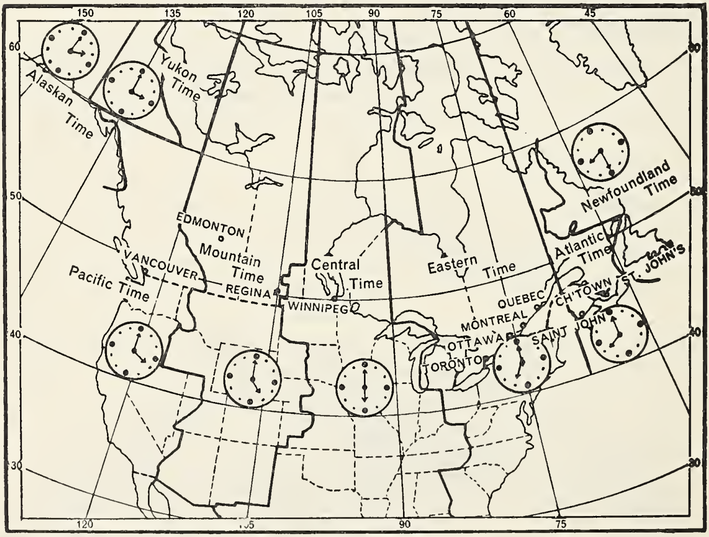

Fig. 1·3. Standard Time zones in the United States and Canada. (12:00 n Greenwich Time.)

Greenwich. Across Canada, there are six time belts between the Atlantic and the Pacific, arranged along convenient longitudes or provincial boundaries. These are: Newfoundland, Atlantic, Eastern, Central, Mountain, and Pacific time. (See Fig. 1·3.)

The rotation of the earth on its axis gives man day and night, and hourly time. The revolution of the earth round the sun gives him the **year**—a period of just over 365 days. (Actually it is 5 hours and a few minutes over the 365 days. For convenience 365 days are counted as a year. To take care of the accumulated extra hours, every fourth year or leap year has 366 days.)

Seasons. The earth circles the sun in a constant way called its orbit. However, the axis on which the earth turns every day is not perpendicular to the orbit of its yearly revolution but inclines at about 23½° from the perpendicular so that the earth swings around the sun with a distinct list. This means that at one time in the year the axis of the earth makes this hemisphere dip away from the sun; at another time, when the earth has circled round to the opposite extreme, it makes it dip towards the sun. (See Fig. 1·4.)

Such changes in position are vital. They mean that at one time this hemisphere is farther away from the sun than at another and receives comparatively low, slanting rays and at another time, more direct rays. The resulting changes in the intensity of the sun's rays cause the **seasons.** When the Northern Hemisphere inclines away from the sun, it is winter; towards the sun, it is summer. Spring and autumn represent stages half-way between.

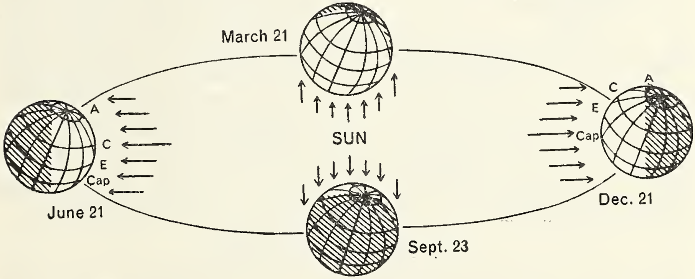

Fig. 1·4. The rotation of the earth, presenting a different inclination to the sun, now bringing the pole into the sun, now shutting it out, is responsible for the seasons. The sun is at zenith over the equator, E, in spring and autumn; over the Tropic of Cancer, C, in the summer, and of Capricorn, Cap, in winter. The June and December positions are known as the earth's summer and winter solstice; the March position as the Vernal Equinox, the September one as the Autumnal Equinox.

If the earth's axis were perpendicular, then the sun's rays would always have the same distribution over the earth. The sun would always be directly overhead, or at the **zenith**, over the equator. Its rays would grow longer and more slanting toward the poles. There would always be a day and a night of 12 hours each.

However, due to its inclination, the earth has a more varied share of the sun's heat. In summer, when the earth inclines 23½° to the sun, the rays of the sun are at the zenith 23½° north of the equator. A line drawn round the earth at that point is called the **Tropic of Cancer.** (Tropic comes from **tropos**, pause: the point where the sun pauses on its northward swing from the equator to zenith at 23½° north or south.) In winter, it is the Southern Hemisphere that lists towards the sun, which is then at zenith over the **Tropic of Capricorn**, 23½° south. (See Figs. 1·4 and 1·5.)

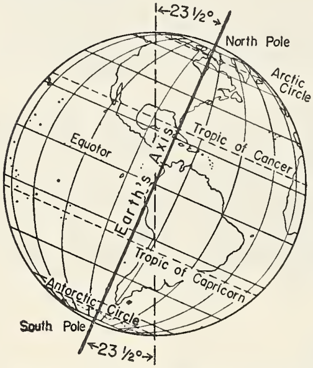

Fig. 1·5. The inclination of the earth's axis from the perpendicular to the plane of the earth's orbit is the basis for fixing principal circles of reference. In this case the Antarctic Circle is where the sun no more strikes the earth, the southern pole being in darkness. The Tropic of Cancer is where the sun is directly overhead or at zenith.

In summer, days lengthen in the Northern Hemisphere, where the pole inclines towards the sun. In fact, the pole is inclined so far that on June 21 the **Arctic Circle** is bathed in light for 24 hours. In winter, the North Pole tilts the opposite way and on December 22 is in darkness for 24 hours, but the South Pole is inclined towards the sun and the **Antarctic Circle** has 24 hours of light. (See Figs. 1·4 and 1·5.)

The lengthening of summer days and the shortening of winter ones and the migration of the zenith from the equator to the northern or southern tropics cause temperatures to increase and decrease, make the climatic belts swing north and south, and profoundly affect agriculture, diet, clothing, housing, transportation, and even industry.

LATITUDE AND LONGITUDE

Although the knowledge of direction helps in locating places north or south of each other, or east or west, it does not tell exactly where a place may be. Very early in history, therefore, men struggled with the problem of how to describe the exact location of points.

This became immensely more important with the Age of Discovery, at the beginning of modern times. Thus, as explorers came to our shores, sailing around Newfoundland and up the Bay of Fundy and the Gulf of St. Lawrence, it was vital that they should be able to "fix" the points at which they landed: first, so that they might know where they were; second, to be able to return there in subsequent years with colonists and supplies; and, third, to prepare maps on which their respective governments in England and France could draw the boundaries for their New World claims.

Fortunately, they were greatly aided in this by their fuller knowledge of the earth. By then, for instance, they knew that the earth was round. They were thus able to divide it into degrees, like a circle. Here the behaviour of the earth and its relations to the heavens were of prime importance. Had the earth been a ball that simply rolled away through space, like a tennis ball tossed into the air, it might have been very difficult to fix any points on it.

If a man marks a spot on a tennis ball, how is he to define the location of that spot? There is nothing on the ball to act as a zero line from which to measure. If he put in a zero line, calling it the middle or equator of the ball, he would do it in an entirely arbitrary way. Another person could as easily divide the ball in half along another middle line.

This possible multiplicity of divisions is possible because a tennis ball has no fixed top and no fixed bottom. It does not spin regularly about an axis. The earth does: it has a top (North Pole) and a bottom (South Pole). Therefore, it is easy to divide by a middle line, and everyone has to agree on that line. It is called the **equator.** North or south of it the distance to the poles may be divided into 90°. Lines drawn through these points, parallel to the equator, make a circle round the earth and are known as **parallels of latitude.** All points north or south of the equator, therefore, can be located on or near one of 180 parallels of latitude. (The distance between degrees is read in minutes or seconds of length.)

Since these lines are artificial and do not exist on the earth, they have to be determined mathematically. This is done by observing the relation of points to the heavens. The earth is not only a spinning ball; it is a moving, spinning ball; it moves in a regular circuit and so has regular relationships with the star groups around it. The Pole Star is generally used for taking readings. It is (more or less) the continuation of the earth's axis. The angle between this line and the horizon at the pole is 90°, which is the latitude of the pole. Measuring the angle between the line of the pole star and the line of the horizon at any place is the basis for calculating the latitude of that place. It can be shown to be the angle between that place and the equator, as subtended at the centre of the earth. (See Fig. 1·6, page 16.)

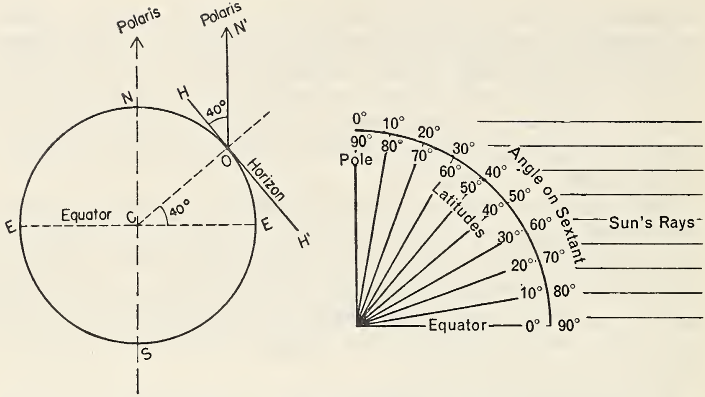

Fig. 1·6. Fixing the latitude by use of Polaris (at night) or sextant reading of sun at March and September equinoxes. (After Fletcher-Wolfe.) ∠HON^{1} (40°) is that between the horizon and the Pole Star. The complement to this angle is equal to ∠NCO. Therefore the complement to ∠NCO is equal to 40°, which is the latitude of the place O.

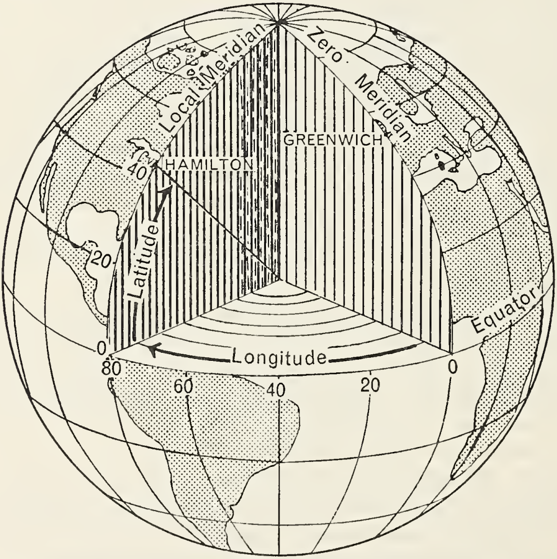

Fig. 1·7. Latitude is measured as an angle at the centre of the earth between the equator and any point; longitude, as an angle at the pole between the prime meridian and any point.

Thus the lines of latitude are readily measured and plotted. They give the north-south co-ordinates of the location of a place, with reference to the equator. The east-west readings provide lines of **longitude**. These lines are known as **meridians** and are measured off at degree intervals, making 360 meridians in all.

It early became the custom for countries to choose one line as the **prime meridian** and then to measure off the globe into 180 degrees of longitude east, and 180 degrees of longitude west of the meridian. This caused some confusion until finally all countries agreed to accept the line running through Greenwich, England (the site of the Royal Observatory) as the prime meridian. The other lines were then put in, measured as angles between individual points and Greenwich, as subtended at the pole. (See Fig. 1·7.)

Longitude is measured chiefly by observing the true time at any place and noticing how it differs from that at Greenwich. If it is 4 minutes less than that at Greenwich, the place is 1° west of Greenwich since the earth revolves through 360° of longitude in 24 hours.

Gradually, therefore, men came to the knowledge of how to locate places exactly, by latitude north or south and longitude west or east. Thereafter, their task was to explore the interiors of the continents and the remoter areas, fix the location of river courses and lake shores, of mountains and passes, of road meetings and of the settlements they developed. The explorers and surveyors then published their findings and, finally, the map-makers plotted them on their maps.

In this way it became possible to have a true idea of the shapes of the continents and oceans and of the relative position of countries on the globe. There then remained only the problems of representing those round shapes and curved distances on the flat surface of the map and of showing them on various scales for various purposes.

QUESTIONS

A

1. What comprises the solar system?
2. What are the chief points of the compass? How is geographical direction found?
3. How are day, season, and year measured?
4. What is the latitude of a place? Define the term longitude.

B

5. What is meant by "the plane of the earth's orbit", "the inclination of the earth's axis", "equator", "tropic", and "pole"?
6. Compare and contrast the size of the earth and its distance from the sun, with the size of the other planets and their distance from the sun.

7. Find the correct positions (latitude and longitude) of the provincial capitals across Canada. Compare the time of each capital with your own time.
8. If a ship sailing from a Canadian port arrived at a point where the time was three hours less than Greenwich mean time, what would its longitudinal position then be? About how many miles would it be from Canada?

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CHAPTER III

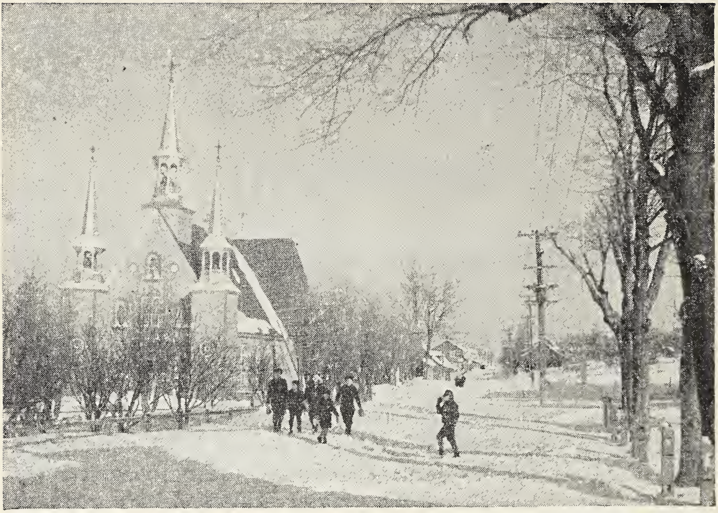
Climate as a Geographic Factor

The Importance of Climate in Daily Living. To city dwellers, the physical environment in which they live seems very remote. Many never see a part of the natural landscape at all. Rivers have been controlled and led through the streets in concrete-clad channels. Hills have been cut away and hollows filled up in order to lay down railway tracks and roads. Shores are often buttressed. Glacial deposits, if they exist, are buried under asphalt and cement. That is why it is sometimes difficult for city dwellers to be aware of the importance of geography, notwithstanding the fact that they very probably owe the location of their city to their geography!

Nevertheless, one aspect of the environment that they all feel and talk about is the weather. In Canada, it is so variable that its vagaries form a constant topic for conversation. People make plans for the day on the basis of weather, choose the kind of food they eat, and select the kinds of clothes they wear as a result of cold, heat, or rain.

Stephen Leacock once said that life in Canada consisted of preparing for winter, enduring winter, and recovering from winter! And he was not far wrong. For winter does tend to dominate this climate. Homes are built with roofs sloped to withstand and shed the heavy snows (See Fig. 2·1, page 20.); with roomy basements to house furnaces, large supplies of coal or oil, and quantities of bottled fruits and vegetables. In the fall, storm windows and doors are put on to give added protection. Many flowers and shrubs in the garden have to be wrapped in burlap and mounded over with earth against winter-killing. The car is "winterized" with anti-freeze and cold-resistant oil: block-heaters are installed and plugged in every night. Trains are equipped with snow ploughs, and snow ploughs are used on the streets. (See Fig. 2·2, page 20.)

In the country, meantime, the cattle are brought into the barns—which are made as big as they are for this purpose. There they stay till the snows are gone again. Huge stores of foodstuffs, drawn off the



National Film Board

Fig. 2·1. The village church, Ste Famille, Quebec. This is a typical winter scene in rural Quebec. Children are well covered up as they walk down the snowy street.

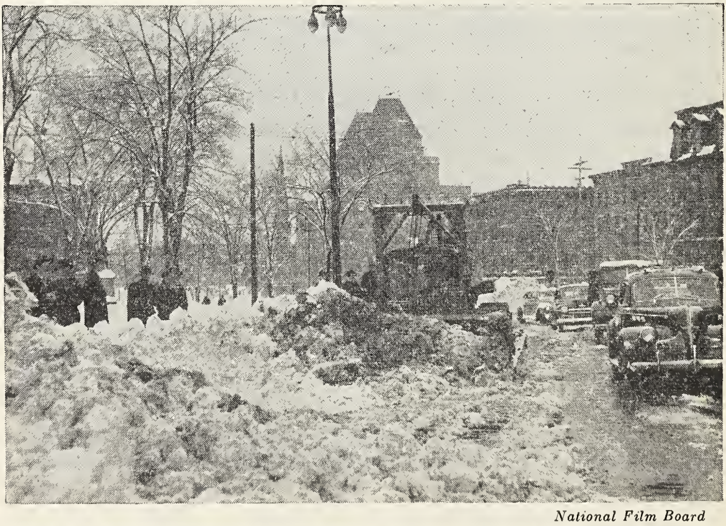


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Fig. 2·2. Snow scrapers clear the Plaza in the heart of Ottawa's business section. The huge piles of snow are later loaded into trucks and taken away.

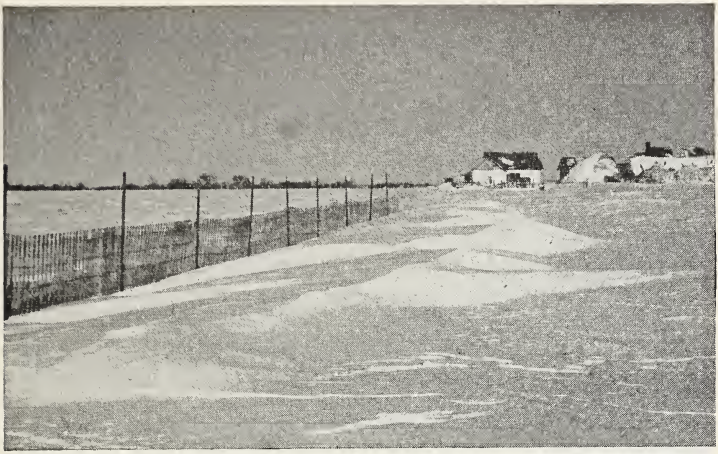

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Fig. 2·3. Wind-breaks help combat drifting snow near a Polish settlement in the Gonor district in Manitoba.

fields, are laid by in silos and lofts for the long immurement. Snow fences are put up in fields along the sides of roads. (See Fig. 2·3.) Wheels are changed for runners; the sleigh makes its appearance.

Everywhere people change to heavier clothing. Fur coats come out of storage; warm boots and overshoes are worn, and children go round in their ski suits and parkas or helmets, looking like little Eskimos. It is the time for skating and for Canada's national sport—ice hockey. (See Fig. 2·4, page 22.) The "roaring game" also comes into its own, and the curling rink is one of the centres of social activity. Hot food and beverages of high protein and vitamin content replace the summer foods.

In the late spring, conditions gradually change. Heaters and defrosters are turned off in the cars. Fur coats are put back into storage. Storm windows are taken down, and screens put up in their place. The garden is "put in". Salad meals and long, cool drinks are served. The summer comes with its golden days. The golf and country club becomes the social centre. Children are out playing baseball. Families go off to recover and relax in cabin and camp, by river and lake. (See Fig. 2·5.)

The Geographical Implications of Climate. Because it is so important in daily living, climate affects the whole geographical distribution of man. In North America, for example, the extremely cold climate of Alaska and the Yukon and Northwest Territories makes vast areas of

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Fig. 2·4. Ice-hockey is *the* Canadian game in winter. Porcupine Gold Kings, on the offensive, play the Timmins Lions in the Porcupine District Juvenile Hockey League game in the Porcupine Arena.

lowlands practically useless, although in better climates, as in southern Canada, lowlands are ideal for agriculture, roads, railways, and settlement. Drought also renders any lowland of little use. For example, in the extreme south-west of the prairies and even more so in the interior plateaux and basins of the United States, plains are less useful for settlement than they might be because of the dryness of the climate. Thus huge areas, which are topographically ideal for human occupancy, are rendered unsuitable by their climate.

By contrast, climate may sometimes make an upland area, topographically unsuited for development, a better home for man than

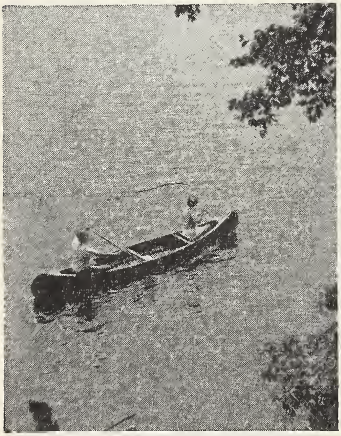

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Fig. 2·5. Summer sports form a marked contrast to winter ones in Canada. Canoeing on Lake Masseiwippi, P.Q., in the Eastern Townships.

a lowland one. So it is in Mexico. There the relatively inaccessible upland is more healthful and comfortable than the coastal lowlands.

Because climate conditions topography in this way, most geographers regard it as the most important influence of the physical environment and base their description of natural regions on it. Looking at its total effect, they see that climate rules out vast areas from human use and that it is largely responsible for attracting the great mass of mankind to concentrate in millions upon millions on a few favoured areas, leaving the rest to primitive societies or to nature.

Climatic Deserts. Enormous areas of the world are rendered undesirable if not useless to man by their climates. They are the cold and the hot deserts. At one extreme are the uncultivable lands extending to the poleward side of a line of July temperature of 50°F. Taking up a large part of Canada and Siberia and including icy lands like Greenland and Antarctica they cover ten million square miles of territory or almost one-fifth of the total land area of the world. If all the high, cold regions on lofty plateaux and mountains were included, this figure would have to be increased considerably. (See Fig. 2·6a.)

At the other extreme are the hot deserts which, even though they have temperatures fit for cultivation, do not have enough rainfall. These include the deserts of Mexico and the south-west states of the United States of America, the vast Saharan and Arabian deserts, Persia, Turkistan, Mongolia, and the Atacama, Kalahari and Australian deserts

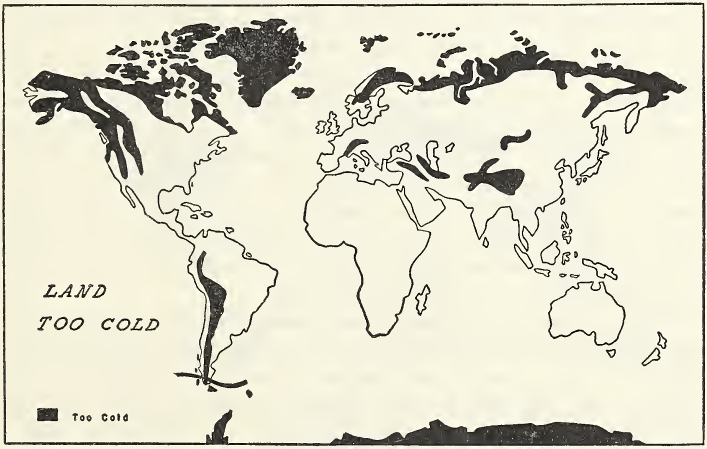

Fig. 2·6a. Diagram of lands too cold for extensive human occupation. They are found in the Arctic and Antarctic and in mountainous terrain and high plateaux.

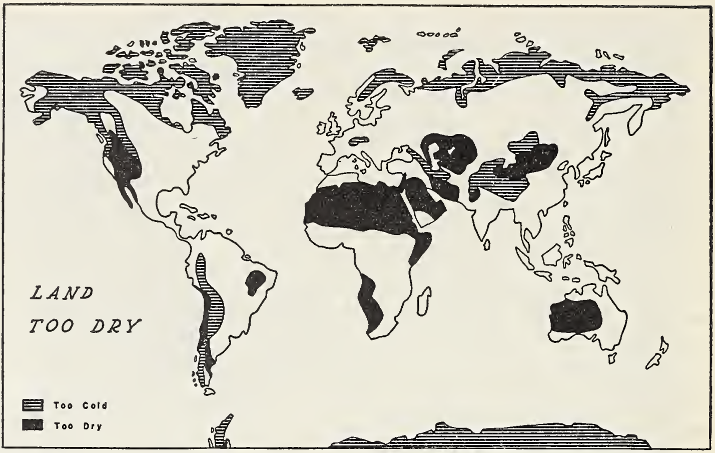

Fig. 2·6b. Land too dry for extensive settlement is found in the deserts of the continental interiors, in the lee of mountains, or on west coasts in the trade wind belt.

of the Southern Hemisphere. It has been calculated that these take up about twelve million square miles of territory, or more than one-fifth of the land surface. (See Fig. 2·6b.)

The cold and hot deserts of the world subtract more than two-fifths of the continental surface from the area available for man on the earth.

The Jungle Lands. At least another six million square miles of territory have a very hot and humid climate which, although productive, has so far been rather unsuitable for human occupation. (See Fig. 2·6c.) This climate, which has been generally unhealthy for man and beast, handicaps another eighth of the land world. Malaria, cholera, yellow fever, black-water fever, and dengue, or sleeping sickness are rampant, and human population has been kept low, except in areas like some of the West and East Indies, where, because of volcanic soil or insular relief, man has had his chance. Population is increasing slowly as a result of modern medicine and sanitation but the cost of supplying these benefits to the mass of the people is still prohibitive.

The Favourable Climates. The climates that favour human comfort, health, and development are found principally along the west coasts of North America and Europe, in the eastern halves of North America and Asia, and in middle latitude lands in Europe, Asia, and the Southern Hemisphere. (See Fig. 2·7.) The continental area so favoured makes up less than a third of the world's land area, for even in these districts rugged relief, poor drainage, eroded soils, and other

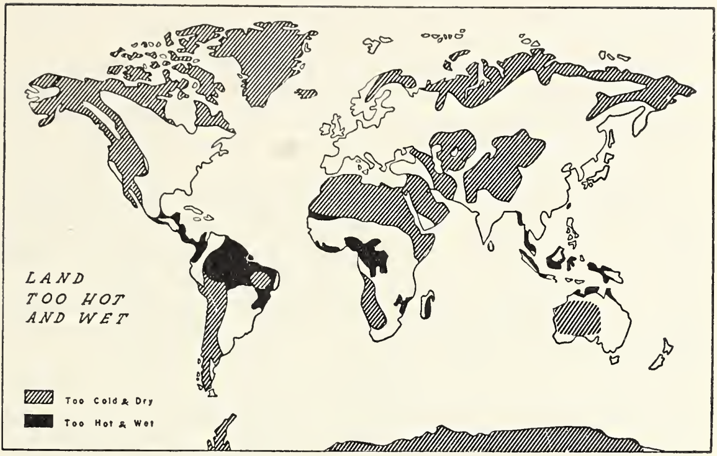

Fig. 2·6c. Land too hot and wet for widespread development occurs in the equatorial rainy climates and on windward coasts in parts of the trade wind belt.

natural factors qualify the advantages of climate. Nature, moreover, does not jump right from desert into the most favoured climates. There is always a zone of transition where the climates may be said to be marginal. These marginal climates cover a considerable area. During

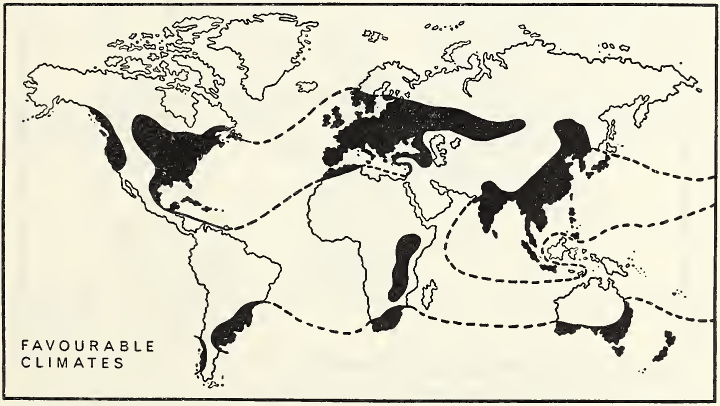

Fig. 2·7. The favourable climates of the world, suited to intensive development and dense settlement, lie in restricted areas. The ones in the Northern Hemisphere have been much more fully developed than those in the Southern.

periods of prosperity, they may be made to work for man; in times of depression, they give him nothing but a bare living.

About 42% of the land area, then, is useless to man on account of deserts and alpine climates. About 30% is of questionable value, because of jungles and marginal climates. This leaves only 28% of the continental surface as well suited to human use and settlement.

Climate and Efficiency. The question of what is the ideal climate has been raised repeatedly ever since the advance of the "temperate" peoples over the "tropical" ones was attributed by Montesquieu to the superiority of Europe's climate to that of western Asia and North Africa. And notwithstanding Voltaire's brilliant rebuttal of this viewpoint and his insistence that climate mattered much less than human initiative and will-power, the study of climate has proceeded to show that its influence is very far reaching.

Scientific analysis of its influence awaited Taylor's work on climate, race, and migration and Huntington's various works on climate and

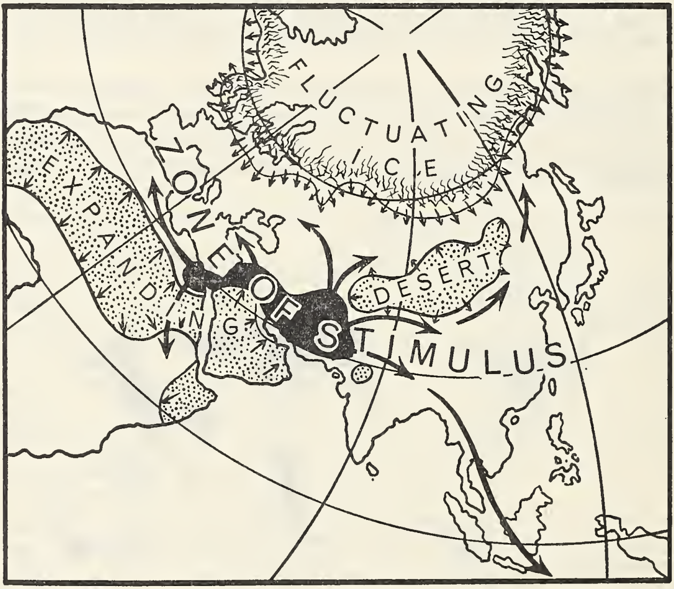

Fig. 2·8. Climate and migration. From the cradle of man (shaded area) within the zone of stimulus, between the fluctuating ice cap and the expanding desert, early races migrated to Australia (Australoids), Africa (Negroids), Europe (Mediterraneans, Alpines, and Nordics), and to E. Asia (Mongoloids and Amerinds). (After Griffith Taylor.)

civilization. A correlation frequently exists between race, civilization, and temperature, and also between civilization and storm tracks.* Although geographical influences have not been so extensive as to ensure that all favourable climates have given rise to great civilizations, it has had this effect — that no great civilization has risen in an unfavourable climate.

In man's early days, the race was subjected to great alternations of climate. At times the weather would become intensely cold as the ice sheets spread down from the mountains and the poles, and man would crowd into the subtropics and tropics; then it would grow hot and dry during interglacial periods; the deserts would grow and expand, and push men to the equator or to the middle latitudes. Thus fluctuating ice caps and deserts forced men to migrate, often in great waves that represented separate racial developments. (See Fig. 2·8.) Then, too, as Elliott Smith points out, the ice tended to isolate men for so long in separate basins that distinctive characteristics and cultures emerged and led to the rise of different races and civilizations.

Eventually, when the ice had melted away and when the deserts had stabilized themselves, men found a narrow belt between the hot-dry lands of the tropics and the cool-wet lands of the northern forests. Here, in the subtropics of the Mediterranean, the Near East, western Pakistan and northern China, civilization was born.

Huntington observed that in contemporary civilization an average temperature of about 60° is considered most favourable, but in early civilizations, (See Fig. 2·9.) where work was done mostly out of doors by manual labour, an average temperature of about 70° was most

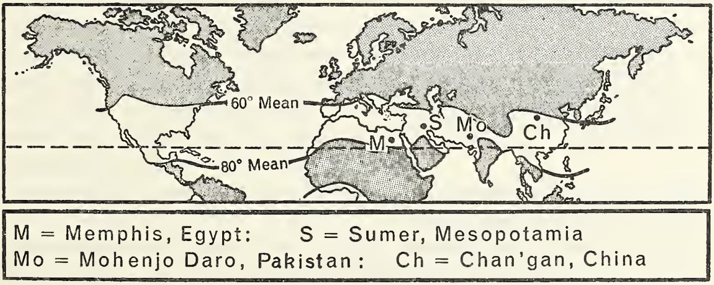

Fig. 2·9. Temperature and civilization. Early centres of civilization avoided areas within the tropics, where temperatures in most months were over 80°F, and also areas outside the subtropics, where temperatures fell below 60°F. most of the year.

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*See References, page 33.

favourable. He also noted that all civilizations have grown up under the stimulating changes of weather produced in tropical, monsoonal, or temperate storms. He attributed the stimulus to the release of ozone in the air following storms.

Studies at the Harvard Institute of Industrial Relations and the Army Services Division of the British Meteorological Office have tended to confirm many of these findings. They show that for a man clothed in a cotton shirt and a worsted suit, doing mechanical work in which he is not making great physical effort, the best external temperatures (i.e., outside his body) are between 60° and 75°. "We may, therefore, define the ideal climate", states Sir David Brunt, "as one in which the air temperature rarely exceeds 75°, and rarely falls so low that it becomes difficult (or costly) to raise the indoor temperature to 60°." Comfortable climates are often stated to be those with a range of temperature from 42° to 75°. (See Fig. 2·10.)

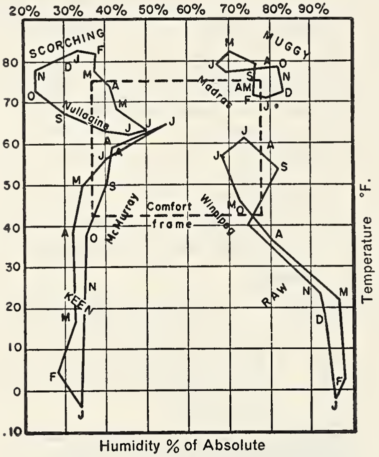

Fig. 2·10. These climographs show by monthly temperatures and humidities the extent of comfortable and uncomfortable weather within and without the comfort frame (After Taylor, modified)

In North America, they lie roughly between Washington and Ottawa with a median axis running through Boston-Buffalo-Detroit. The climate of Richmond-Washington-St. Louis has from 5 to 6 weeks above 75° but a winter season in which it is easy to keep temperatures above 60°. The climate of Quebec-Ottawa-Winnipeg has from 4 to 8 weeks in which it is costly to bring the indoor temperature to 60°, but the summer temperature is rarely above 75°. From Washington south, the climate becomes gradually more relaxing; from Ottawa north, it becomes more strenuous.

South of Washington, however, the southern states are swept both by monsoonal and temperate storms, and these create a stimulating effect, bringing in constant draughts of cool air that largely overcome the relaxing influence of high summer temperatures. Similarly, temperate cyclones in northern Canada bring in warm waves of air that modify the average situation.

There is a large area, therefore, in the United States and Canada where the climate is particularly favourable to human effort and tends to produce people with an unusually high degree of energy and with great powers of stamina. This is undoubtedly a factor in the geography of agriculture, other forms of primary production, trade, and industry, and helps to account for the leading role of North America in the world economy. Not that the continent is what it is because of climate. After all, for thousands of years it made little progress. Once progressively minded people began to develop it, however, they found a climate that gave them the greatest opportunity to go ahead.

CLIMATE AND OCCUPATION

It is sometimes thought that man may dismiss climate because he has conquered it. He has found ways of growing things in all but the driest and coldest climates. Every year new breeds of plants or of animals are raised in order to defeat some climatic hazard or other—heat, excessive humidity, drought, or frost.

Nevertheless, climate is more important than ever because its advantages are an economic asset in a civilization that is becoming more competitive. For example, when general farming was the vogue, there was not the same necessity for the farmer to concern himself about the climate as there is today. Even if the fruit which he grew was small or did not look good, it was likely to sell because the present specialization and competition in fruit did not exist. Besides, he could count on selling eggs, meat, or other produce to round out his income. No doubt he kept cows for the dual purposes of milking them and of selling them for beef.

As more specialized farming became possible, with railways and refrigerator cars and different kinds of processing plants, it was necessary for fruit growing to concentrate where the climate was best suited to it, and similarly for dairy farming and beef farming to locate themselves where they had the best chance. A man specializing in milk production, no longer able to look after large orchards, yielded his interests in fruit to a man specializing in fruit production.

Thus, as man's economy has advanced, he has become more dependent on geography, not less. Economic forces make people choose a geographical location *where the optimum conditions for their particular calling exist.* If they do not do that, they may not remain in business. Good business requires scientific adjustment of land use to the geography of the land. Climate is one of the chief factors in the geography of the land, and everywhere it is at work helping to locate one occupation here and another there.

The fur trade long obeyed the dictates of climate and still does where it depends on the trapping of wild animals. Men once trapped over most of North America. As civilization progressed, however, agriculture competed successfully for the more favoured climates, and trapping concentrated on those other areas where it offered the best, if not the only, use of land. Here, in the boreal forest and in the tundra, it has continued to make use of the many fur-bearing animals that are associated with those environments: muskrat and beaver, the silver fox and the arctic fox, marten, ermine and seal, and other types.

Fisheries are also dependent to a certain extent on climate. Fish become accustomed to particular temperatures and thrive best under specific geographical conditions. Off the Grand Banks of Newfoundland and off Nova Scotia banks, a cold current from a polar climate mixes with a warm current from a tropical climate to produce some of the most stimulating conditions for fish life to be found anywhere. This fact does much to explain Canada's importance in the world's fish trade.

Forest activities are as closely related to climate as are the trees on which they depend. In British Columbia, one of the chief activities is lumbering because the climate favours giant cedars, hemlocks, and firs. In eastern Canada, where climate favours spruce, the making of pulp and paper is an important occupation.

Mining is not so dependent on climate because it uses minerals whose location is not affected by weather. Nevertheless, other things being equal, the mining of a product will go ahead first where the climate is generally suited to life. It was only when men used up the high-grade iron ores in the livable areas about Lake Superior that they turned to develop the ores of inclement Labrador. A cold, severe climate makes mining more costly. It requires the special heating of parts of the mine and mine buildings, the insulation of water pipes between buildings, the use of snow ploughs to keep the roads and the railways open, and so on. It may also lead to more colds, coughs, and other diseases among the men and so impair their ability to produce. All these things help explain why the great mineral deposits of the Canadian North have as yet not been fully worked.

Agriculture is still more sensitive to climate. The special requirements of plants and, to a certain extent of animals, too, have led farmers to choose soils and climates that best support them. Fruit farming is concentrated principally in the Okanagan and Kootenay Valleys of British Columbia, in the Niagara Peninsula of Ontario, and in the Annapolis Valley of Nova Scotia, because these sheltered localities offer the best protection in a country where frost is generally too severe for commercial fruit growing.

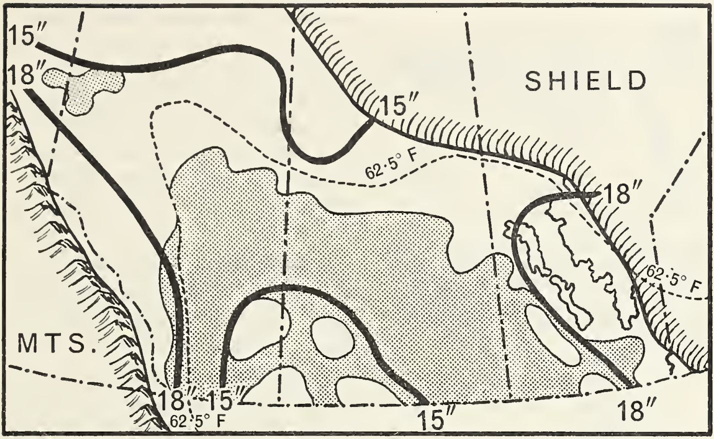

Fig. 2·11. The distribution of wheat and climatic controls. Most of Canada's wheat (see dotted area of map) is grown in areas with over 15″ though not more than 18″ of rainfall, and with July temperatures of over 62.5°F. (Note that Chinook winds in the foothills and long hours of daylight in the Peace River District have carried production to areas with a somewhat lower summer mean.) Topographical controls, as imposed by the Shield and the Rocky Mountains, are also important.

The more arid areas of the Canadian Prairies have been left to natural pasture and to ranching, while the more humid areas, with black soils, have been put under mixed farming. Areas between are chiefly under wheat farming. (See Fig. 2·11.)

In Ontario and Quebec, highly specialized types of farming, like the raising of canning crops and tobacco, occur in the southernmost parts where the temperate climate has a warm summer with a moderately long growing season. On the moraines, farming changes to a mixed type, while, on the uplands, where the growing season is quite short, it depends mainly on hay and the rearing of cattle and sheep.

Although corn is grown very widely over Canada, it is locally important chiefly in south-west Ontario where a long growing season with early summer rains and a bright fall are ideal. In the United States, the extensive raising of corn is located in the "corn belt", where prairie soils and hot but not scorching summers, together with plenty of rain at the opening of the growing season and long sunny days at the end, are present.

Cotton was once tried as far north as Pelée Island and New England. Although it was found *possible* to grow it there, it is not *economic* to do so: frosts are too common. Therefore cotton raisers concentrate within

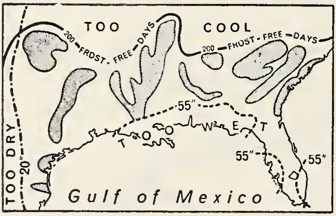

Fig. 2·12. Climate and cotton. The principal areas of cotton production in the U.S.A. (see dotted area of map) are south of a line marking 200 frost-free days, east of the 20" rainfall line and north of the 55" rainfall line. Climatic controls are strong.

a climate that gives them an average of 200 frost-free days. (See Fig. 2·12.) Similarly California, Texas, and Florida are the chief citrus fruit regions of the continent because very little danger of winter killing occurs there, the temperature rarely falling below the critical temperature of 20° F.

Transportation is influenced considerably by climate. Routes try to follow land where there are no marshes or drifting desert sands, where there is enough water to raise steam in the engines but not enough to wash out the tracks, where snow is not too serious a problem, and where both railway and road can serve as much of the population as possible.

Trade and industry also are affected by climate. A city which is placed in such a position as to command the products of two or more climatic zones usually forges ahead as a trading centre and has a variety of enterprises as compared with a city centred within one climatic belt. Climates influence the kinds of agricultural or forest products available as raw material for industry and thus help to determine the kind of industry likely to arise in places. Vancouver has many lumber industries close to the forests of giant firs up and down the west coast; Winnipeg, gateway to the prairies, has its flour and meat-packing plants; Quebec, on the edge of the Laurentian forests, its pulp and paper mills; and St. John's, where the Labrador Current and Gulf Stream mingle, has its fish packeries. These are but a few examples. Nearly every town has one or two industries depending on local products raised there because of special climatic advantages.

Climate, then, is a very far-reaching force, and its geography strongly influences the geography of man and his various occupations and settlements.

QUESTIONS

A

1. List the features of the house and of automobiles, permanent and temporary, that appear to be an adjustment to winter.
2. What Canadian sports are played in fall, winter, spring, and summer?
3. How much of the earth is too cold for extensive settlement?

4. In Fig. 2·6a, identify and list the individual areas that are too cold. Are there continents entirely too cold for settlement? Are there continents where coldness is not significant?

B

5. Where are the lands that are too dry for extensive settlement? List the drought-stricken areas, continent by continent, as shown in Fig. 2·6b.
6. Name the jungle lands, as shown in Fig. 8·6c, in which man has not yet made substantial inroads.
7. Canada and Brazil, roughly equal in size, have large areas relatively unsuited to settlement. Name such areas. Canada has only about 15 million people, Brazil 45 million: why?
8. In Fig. 2·8, about how much of North America has a climate really favourable to man? How much of Europe may be considered favourable? Which of all the continents is climatically the most favoured?
9. At Winnipeg, how many months of the year may be considered (a) comfortable, (b) costly to keep comfortable by central heating, extra clothing, warming foods, etc?

C

10. Draw a sketch-map of British Columbia showing how the main commercial forest areas are related to rainfall.

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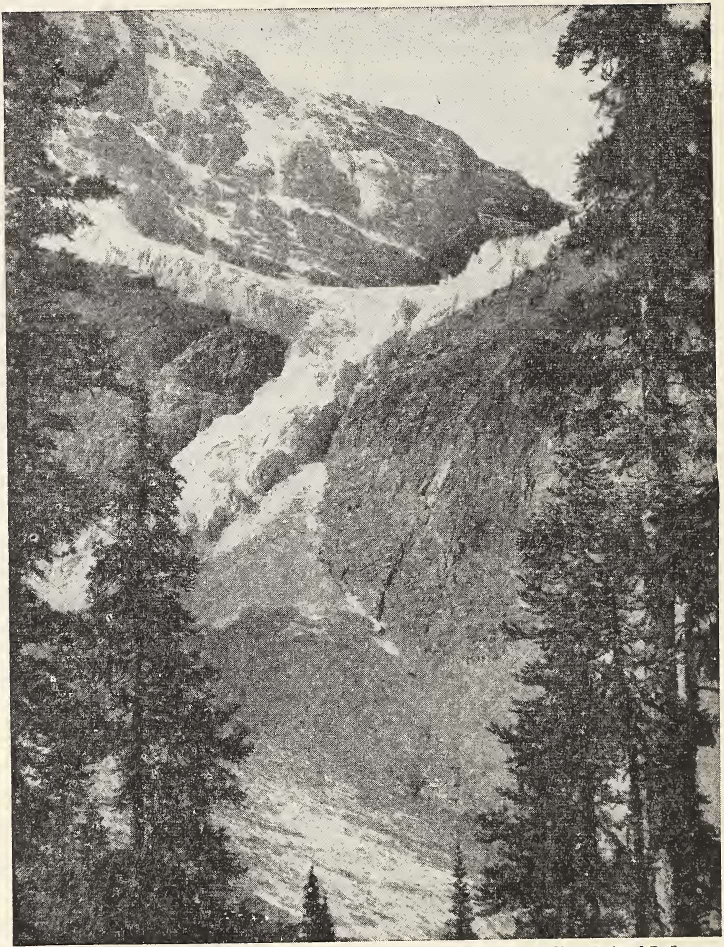


Canadian National Railways

Glacier of the Angel, Mt. Edith Cavell, Jasper National Park, Alberta.

CHAPTER III

Natural, Human, and Geographic Regions

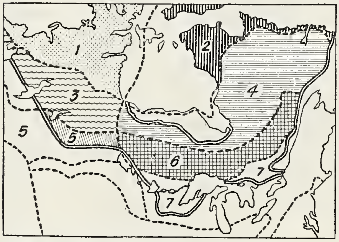
The examination of the main elements of the physical environment has revealed the amazing variety of landscapes on the earth; some are coated with eternal snow; some are green and luxuriant; some consist of jagged peaks and narrow tortuous valleys; others, of broad and gentle plains. Man wonders whether there is any rhyme or reason to it all or whether it is all an endless confusion of different features.

A closer study shows, however, that large tracts of the globe have a relatively homogeneous character. In one aspect or another, they have a sameness about them which distinguishes them from surrounding areas. Further knowledge shows that these tracts generally repeat themselves in other parts of the world; e.g. the wide, treeless tundra, grey with lichens or bright with summer flowers, which extends in a more or less uniform landscape over northern Canada, may be seen again in northern Europe and northern Siberia. Next to it, lies the vast belt of boreal forest, stretching from Alaska to Newfoundland, which can be noticed, once more, in Scandinavia, northern Russia, and Siberia. The rugged, rocky, ice-scoured appearance of the Canadian Shield, which gives a certain unity to all the land around Hudson Bay, is very similar to that of the Finnish landscape. Thus there is some reason, there is a **pattern**, in the changing scene. The earth does not consist of an inextricable mixture of factors but of a number of distinct **regions**, each with a characteristic appearance, repeated again and again wherever similar conditions arise. It is true that most of these regions merge gradually into one another and that between them, there are transitional zones with no very clear character, but the core of each region is unmistakable and sets its stamp upon the scene.

A **region** may therefore be defined *either* as any area of the earth's surface with homogeneity in one or more of its characteristics *or* as an area of such strong nodality that it draws diverse elements together into a coherent whole. There are simple, one-factor regions, and more complex, multiple-factor regions. But each is alike in that, within its bounds, there is a certain recognizable sameness, or that, at its centre, all things cohere. By recognizing regions, plotting them, and classifying them, we can piece together the picture of the earth as a whole, to which they all contribute.

It is relatively easy to identify single-factor regions. Such are, for example, the structural regions, physiographic regions, climatic regions, vegetation regions, and the soil regions, which have already been outlined. Thus our continent can be divided into central shield, marginal fold mountain, and interior sedimentary lowland, on the basis of structure. Or it can be divided on the basis of relief, into lofty, glaciated mountains, high plains, low, rugged plateaux, low plains, and old, rounded mountains. Then there is the broad division into the arctic arid zone, the temperate humid zones, and the temperate arid interior. Barrens, mossland, forest, and grassland would provide another simple breakdown, as would the division between pedalfers and pedocals.

When the single factor alone is studied, the corresponding region looks very obvious. Consequently, people familiar with one factor, more than with others, tend to divide a whole country on the basis of that factor and say, "These are the regions of the country". They do not think to compare those divisions with regions based on different factors. If they were to make multiple-factor comparisons, they would see that the boundaries of single-factor regions rarely fall together. Even though there is a close relationship between relief and climate, a physiographic map does not coincide with, far less replace, a climatic one. (See Fig. 3·1.) There is an even closer link between climate and vegetation; yet the boundaries of plants can be seen to leap beyond or fall short of those of climate in many cases.



Canadian Shield Boundary . . . ═══
Region Boundaries . . . . -----

Fig. 3·1. Conflict between physiography and climate as the basis for delineating natural regions. Physiographically the whole of the Canadian Shield may be regarded as a major region. Climatically the Shield can be divided into at least seven regions, most of them major regions: 1 western arid Arctic; 2. eastern subhumid Arctic; 3. western subhumid Sub-Arctic; 4. eastern humid Sub-Arctic; 5. cool temperate continental interior; 6. cool temperate semi-continental and east coast; 7. cool temperate, St. Lawrence type. Notice that most of the climatic belts embrace other kinds of country as well as the Shield.

It is misleading, therefore, to use single-factor regions as the only, or even the main, regions of a country. In nature, no factors are single;

all act together. Consequently, multiple-factor regions are a much sounder guide to the description of a country than single-factor ones, and should be used wherever possible.

Major Categories of Regions. The factors discussed so far have all belonged to the natural landscape; that is, to a world assumed to have been untouched by man. But the natural landscape very seldom remains untouched by man. Indeed, man is a most active force in the landscape, changing the whole distribution of animal life and vegetation, affecting climate, and even modifying relief. So the human factor should be reckoned with. (Fig. 3·2a and 3·2b, page 38.)

This means that regions may also be defined in terms of human factors like race, language, or religion, occupation, and political organization. Regions may be based on these factors alone or on combinations of these factors, as for example, cultural regions, where language, religion, law and so forth are combined.

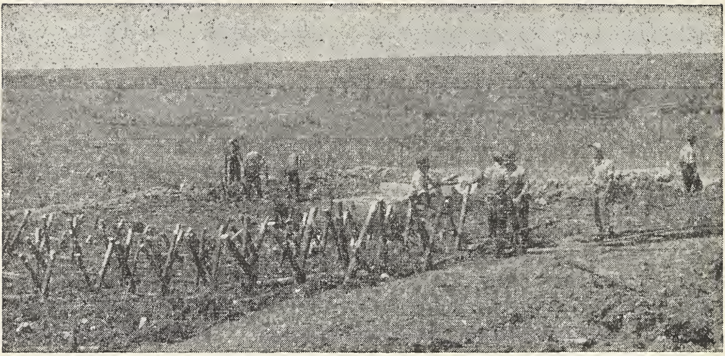
The physical appearance of the earth can be depicted in terms of **natural regions** depending on a grouping together of natural factors such as bedrock and build, relief, climate, vegetation and soil. The man-made landscape, which often modifies and in part replaces the natural one, should be described in terms of **human regions**. Physical geographers are prone to adopt natural regions as a basis for picturing the earth; human geographers tend to use human regions.

But the world is neither all earth nor all man; it is a never-ending struggle between both, and a combination of both. Natural and human regions by no means coincide. For example, if physiography, climate, and vegetation were taken as the basis of a natural region, most of New Quebec and Northern Ontario would be one region; yet they are divided politically and, somewhat more indefinitely, by language and religion. (See Fig. 3·3, page 39.) The natural environment is the same, but the human reaction is different, producing different architecture, division of land, farm types, forms of villages, and a host of other things which create a different atmosphere. (See Fig. 3·4, page 39.)

The geographer has to weigh which group of factors is more important. As he does so, he may note another type of region emerging which embraces and holds together both natural and human forces. This holding together is the thing which characterizes such a region. Because this holding together is at the heart of geography, it marks out what might be called **geographical regions** on the earth.

To appreciate geographical regions, it is valuable to know the natural and human regions from which they are formed.

NATURAL REGIONS. A natural region may be defined as an area in which several factors of the natural environment combine to give



National Film Board

Fig. 3·2a. Humanizing the natural landscape, making meadowland out of marsh, Aulac, N.B. In the hollow below and beyond the men, is the natural sea marsh. Beyond it, the land is covered with bush.

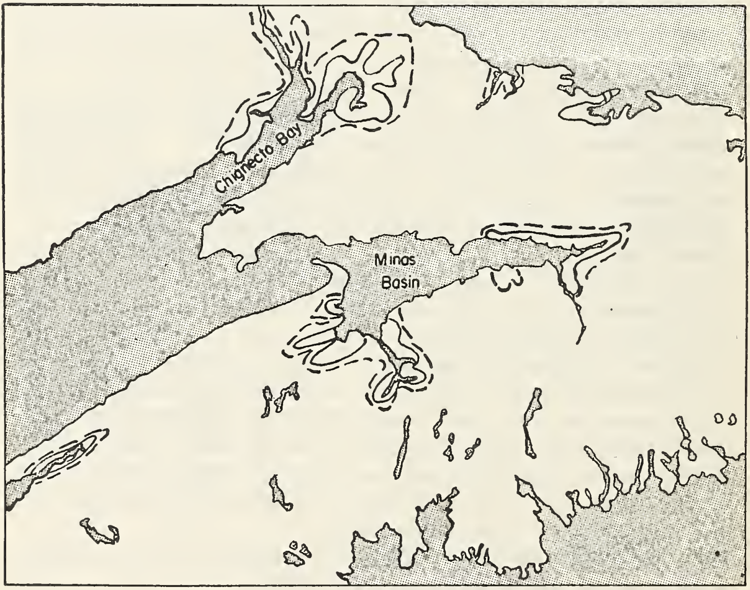


Fig. 3·2b. The transformation of the Nova Scotia marshlands. Marshlands in 1671— — — — —; Meadows in 1790————.

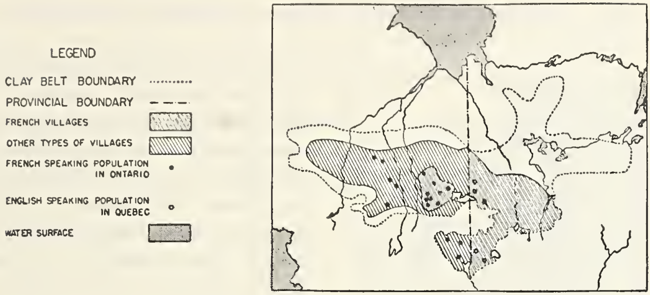


Fig. 3·3. The Ontario and Quebec Clay Belt: physical unity, cultural diversity. The natural region of the Clay Belt has been divided into two human regions by the history of settlement.

a certain sameness or coherence to the landscape. Because of the close relation between relief, climate, vegetation, and soil, these often form a harmonious grouping, and provide an area with the same relief, temperature, rainfall, and plant cover, in a distinctive and typical combination.

Thus the southern prairies have the same general horizontal structure and low relief, and a semi-arid climate, pedocal soils, and grassland vegetation. These things depend upon and to a certain extent rise out of each other. Their relationship is distinctive and gives character to the whole area. It may be described then, as a well marked natural region.

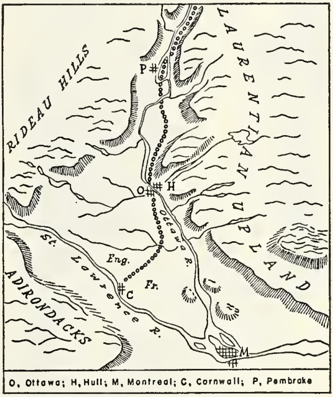

RIDEAU HILLS
LAURENTIAN UPLAND
P
H
O
Ottawa R.
St. Lawrence R.
ADIRONDACKS
Eng.
Fr.
C
M
O, Ottawa; H, Hull; M, Montreal; C, Cornwall; P, Pembroke
Boundary between French (east) and English (west)

Fig 3·4. Physical unity, cultural diversity of the Ottawa valley. Notice the boundary between French-speaking (east) and English-speaking (west) settlements.

South-western Ontario is another. It is a belted lowland in a moderately low latitude, with a temperate humid climate having a long summer and associated with grey-brown earths and a broad-leaved deciduous forest. Again, none of these factors overlaps or cancels out the other. They are all related to each other in an inevitable and unmistakable way. They give rise to a typical landscape which people can easily conjure up in their minds. Similarly, the plain of Montreal has a natural unity, flat but with occasional hills, humid, hot in summer, covered with grey-brown pedalfers and with a rich, deciduous forest (wherever that is left standing).

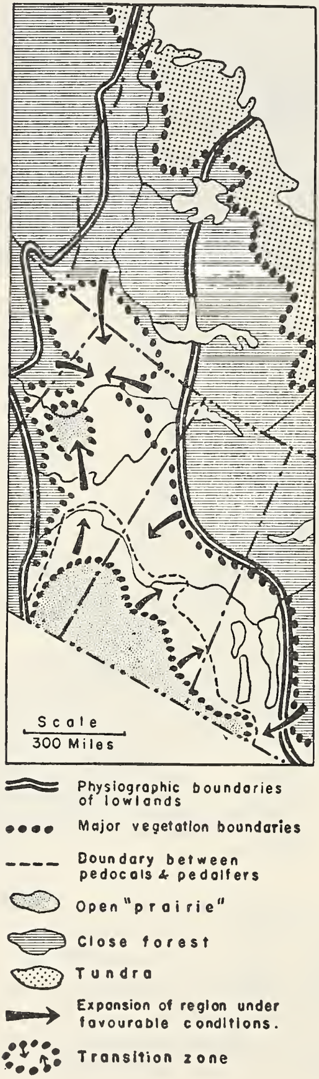

Scale
300 Miles
Physiographic boundaries of lowlands
Major vegetation boundaries
Boundary between pedocals & pedalfers
Open "prairie"
Close forest
Tundra
Expansion of region under favourable conditions.
Transition zone

Fig. 3·5. Natural regions in the Canadian prairies and the Mackenzie basin. Although the whole area between the Shield and the mountains is, basically, a single physiographic region, it is made up of several vegetation regions. Two major contrasts occur between the open prairie and the close forest. Each of these is dominant in its core area. Between the core areas is a zone of transition that cushions the change from taiga to steppe.

In much the same way the heart of the Maritimes has a unity of (old mountain) structure, (brown podzol) soils, (humid, temperate) climate, and (Acadian, mixed coniferous-deciduous) forest. Well marked natural regions can be made out in the block and trench sector of southern, interior British Columbia, or in the Fraser delta.

These are some of the readily distinguishable regions. But it should be noted that at their outer edges, their character very often changes and, instead of having agreement between all the factors, there is disagreement between them, or between two or more of them. Thus the overall relief typical of the prairies extends far north, down the Mackenzie basin, but the semi-arid climate and grassland vegetation do not. They give way gradually to a more humid climate with park land and then forest. Farther north, there is a new region with horizontal strata covered by podzols and boreal forest. (See Fig. 3·5.)

It is difficult to say where one region ends and another begins. If each factor is plotted separately, it is obvious that there are **core areas** where they all coincide, and **transition areas** where they differ, though not in all respects. These transition areas cushion the change between one core area and the next. Perhaps the transition zones should themselves be shown as regions. They are usually divided, however, between the two or more core areas to which they gradually give way. (See Fig. 3·6.)

It should be remembered that where a map shows one region, separated from its neighbouring regions by a narrow line, *the real separation is usually along a broad zone.*

Herbertson was one of the first to divide the world into natural regions and his system is still frequently used. Basically, it divides the earth

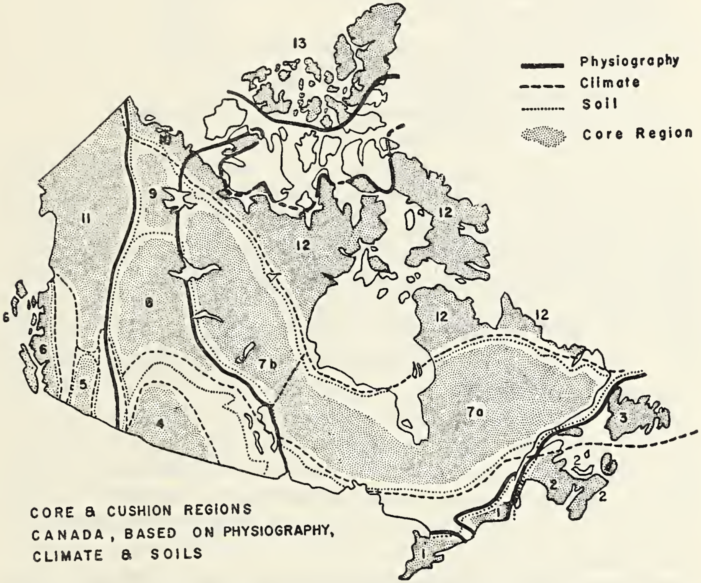


Fig. 3·6. Core and cushion areas in Canada. Between core areas in the dry plains and the subhumid Shield there exists a zone of transition that cushions the change from forest to steppe.
1. Eastern Interior Lowlands; Dbf climate; grey-brown soils. 2. Appalachians; Dbf climate; eastern podzols. 3. Appalachians; Dcf climate; eastern podzols. 4. Western Interior Lowlands (south); BSk climate; brown soils. 5. Intermont Uplands; BSk climate; brown soils. 6. Pacific Coast Slope; Cbf climate; forest brown soils. 7. Southern Shield; Dcf climate; northern podzols. a, black spruce; b, white spruce. 8. Western Interior Lowlands (north-central); Dcf climate; wooded grey soils. 9. Western Interior Lowlands (north); Dcf climate; northern podzols. 10. Western Interior Lowlands (Arctic); ET climate; tundra soils. 11. Northern Cordilleras; Dcf climate; mountain podzols. 12. Northern Shield; ET climate; tundra soils. 13. Innuitias; ET climate; tundra soils.

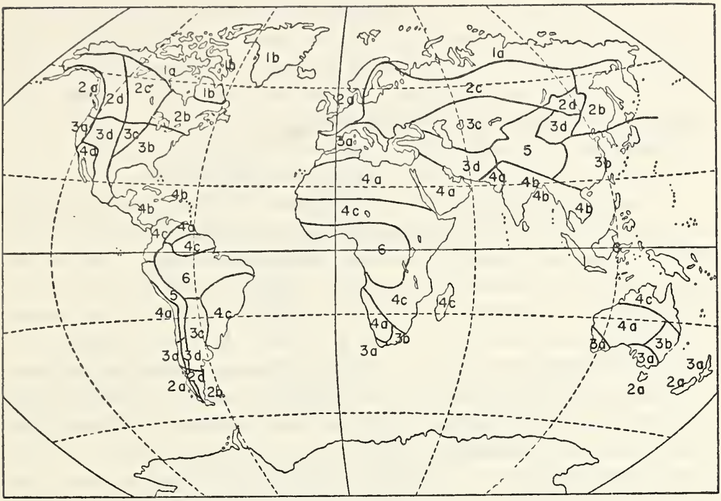
into areas which have a certain unity of configuration, climate, and vegetation, as follows:

1. POLAR REGIONS
    - (a) Lowlands (Tundra type)
    - (b) Highlands (Ice-cap type)
2. THE COOL TEMPERATE REGIONS
    - (a) West Margin (West European type)
    - (b) East Margin (Quebec type)
    - (c) Interior Lowlands (Siberian type)
    - (d) Interior Mountain Area (Altai type)
3. THE WARM TEMPERATE REGIONS
    - (a) West Margin with winter rains (Mediterranean type)
    - (b) East Margin with summer rains (China type)
    - (c) The Interior Lowlands (Turan type)
    - (d) The Plateau (Iran type)
4. THE TROPICAL REGIONS
    - (a) The West Tropical Deserts (Sahara type)
    - (b) East Tropical Lands (Monsoon type)
    - (c) Inter-tropical Tablelands (Sudan type)
5. LOFTY TROPICAL OF SUB-TROPICAL MOUNTAINS (Tibetan type)
6. EQUATORIAL LOWLANDS (Amazon type)

The reader may easily reconstruct the essential features of these regions by referring to what has been said about the shape and relief of the continents and the distribution of climate. For those living in the Western Hemisphere, a different set of names might be used, since those originally selected were mostly from Europe and Asia: 1(a) and (b) could remain the same; 2(a) might be termed the Pacific North-west type; 2(c) the Canadian Prairie type; 2(d) the central Cordilleran type. (See Fig. 14·7.) Similarly 3(a) is the Californian type; 3(b) the Southern Atlantic States type; 3(c) the High Plains type; 3(d) the American Intermontane Plateau type. 4(a) might be called the Sonoran type, with better justification than Saharan (which is more than West Coast). 4(c) could be rendered the Guiana type. There is really no good Western equivalent for the Monsoon type 4(b). 5 might be named the Titicaca type, from the high plateaux of Peru and Bolivia which border that Lake.

HUMAN REGIONS. Human regions are perhaps more difficult to define than natural ones. It is universally acknowledged that they exist, but different factors are used in defining them and thus rather different regions can be arrived at. As indicated, they are areas in which several factors of the human environment come together to characterize the landscape.

Once again, it is as well to emphasize how much they differ from natural regions. They do so by the way in which they are organized. Man organizes space to suit his own needs; for example, he cuts down certain types of trees and cultivates others; he ties in rivers with road



MAJOR NATURAL REGIONS

1. Polar. (a) Lowlands (Tundra type); (b) Highlands (Ice-cap type).
2. The cool temperate regions. (a) Western margin (West European type); (b) Eastern margin (Quebec type); (c) Interior lowlands (Siberian type); (d) Interior mountain area (Altai type) .
3. The warm temperate regions. (a) Western margin with winter rains (Mediterranean type). (b) The eastern margin with summer rains (China type); (c) The interior lowlands (Turan type); (d) and the plateau (Iran type).
4. (a) The west tropical deserts (Sahara type); (b) East tropical lands (Monsoon type); (c) Intertropical tablelands (Sudan type).
5. Lofty tropical or sub-tropical mountains (Tibetan type).
6. Equatorial lowlands (Amazon type).

Fig. 3·7. Herbertson's Natural Regions of the World.

and rail; he divides the land by different boundaries which tend to make economic and political units out of them and thus to orient development and trade.

In any event, "It will be found that the physical landscape—this harmonious combination of nature in a given space—has been changed, adapted and, alas, sometimes destroyed by groups of men. In all these cases, the imprint of man is noticeable. The flow of a river has been reversed, a mountain has been cut, a forest has been cleared or the soil has been plowed. Human occupation has transformed the physical landscape into a cultural landscape." *

For example, take the Lower Great Lakes-St. Lawrence region. This has a certain natural unity, being mostly a sedimentary lowland covered

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*Personal communication from Dr. Pierre Camu.

with glacial till, having a cool temperate climate with a relatively warm, long summer, with grey-brown soils, and a hardwood forest of maple and elm, mixed with oak, hickory, beech, and ash. The natural landscape looks very much the same from Windsor to Three Rivers, (with the possible exception of the Kingston area).

In this tract of land, however, there have developed two distinct and, in many cases, opposite cultural landscapes. This is seen as one drives from Kingston to Montreal. Along the Ontario roadway, farms are fairly large and square; they are strung along concession roads which run about a mile apart through square or oblong townships. Villages are rather irregular, consisting of scattered buildings with at least two or three churches of different denominations. (See Fig. 3·8, Wales.) Signs on shops and road-posts are mainly in English. An Orange Lodge or a curling rink are not infrequent, denoting Ulster and Scottish settlers.

Farther on, a change occurs. The farms are narrow and small; they lie in cantons, not townships. They are close together. In some parts of the Montreal plain, they are so close that the traveller has the impression of going through one long village. The village proper is more compact. There is only one church, usually a large stone building with a gleaming silver tower, commanding the fields around. (See Fig. 3·8, Repentigny.) There are, of course, no Orange Lodges, but there might be a building for the Knights of Columbus. Store signs are mainly in French. It is obvious that one has crossed into a different landscape.

Human regions, then, reflect such things as race, language, religion, law and administration, and a different organization of land, due to a different general culture. Human regions may also be defined in terms of occupation, or rather of the dominant function, of an area. For example, there are urban and rural regions; these function quite differently. There are settled and pioneer regions, which also have different occupations; thus:

Urban: Little primary production, much secondary production; much trade and industry; finance, professional services; art, music, the theatre; administration.
Rural: Much primary production, little manufacture or trade, etc.
Settled: Many economic functions; considerable surplus wealth; population with significantly high proportion of female and old.
Pioneer: Few and limited occupations; primary production; population significantly male and young.

Coming down to a smaller area, all *cities* divide themselves into human regions on the basis of distinctive functions. Thus there is a business (offices and stores) area, a bright-light (amusement-theatre-restaurant) area, a blighted (run-down and slum) area, an industrial (factory)

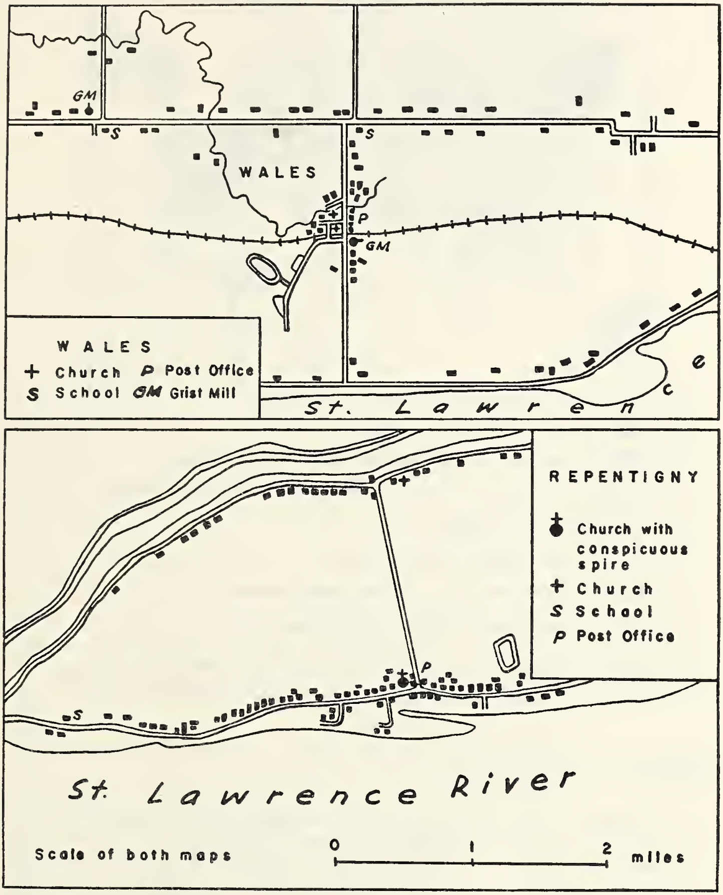

Fig. 3·8. Typical Ontario and Quebec villages on the St. Lawrence.

area, a residential area, a golf-and-country club zone, and a rurban (rural-urban) zone. Such areas are known as **functional regions.** (See Fig. 3·9, page 46.)

Human regions have further been defined on the basis of the ease or difficulty of functioning, or on the patterns of work, or the rewards of labour, found from place to place. Thus Fleure's human regions consist of:

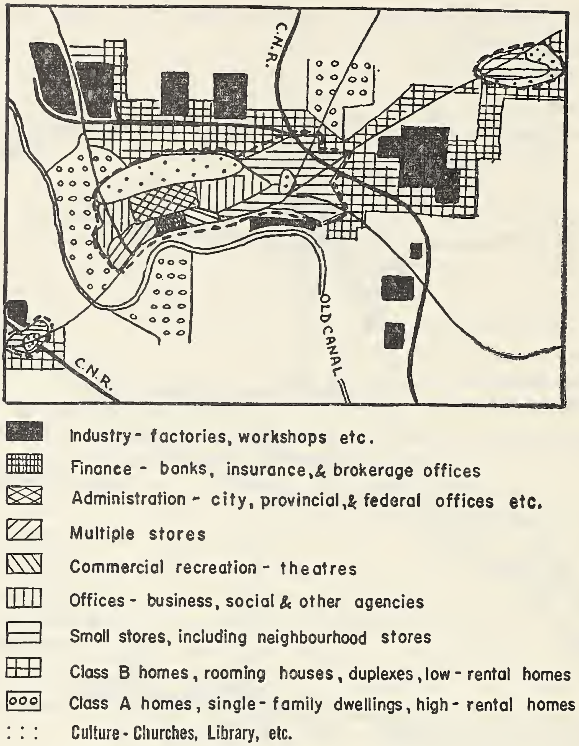
C.N.R.
C.N.R.
OLD CANAL
■ Industry - factories, workshops etc.
▥ Finance - banks, insurance,& brokerage offices
▩ Administration - city, provincial,& federal offices etc.
▨ Multiple stores
▧ Commercial recreation - theatres
▥ Offices - business, social & other agencies
▤ Small stores, including neighbourhood stores
⊞ Class B homes, rooming houses, duplexes, low - rental homes
ooo Class A homes, single - family dwellings, high - rental homes
: : : Culture - Churches, Library, etc.

Fig. 3·9. The human regions of a city based on their dominant human activity or function. (St. Catharines, Ontario)

Zones of Difficulty	where, in spite of constant endeavour it is always difficult to be sure of a livelihood.
Zones of Effort	where conditions are such as to make a considerable amount of effort necessary to obtain a living, but where the reward is worth the labour.
Zones of Increment	where rewards are comparatively easy to win, although some effort and application are required to win and maintain them.
Zones of Debility	where rewards are won without much effort and so there is not much incentive for thrift, foresight, adaptiveness, skill and endurance.

Since the ease or difficulty of securing a living depends in large part on the natural environment, these human regions do reflect climatic, soil, and relief conditions to a certain extent. However, they stress, not those conditions themselves, but man's reaction to them. (See Fig. 3·10.)

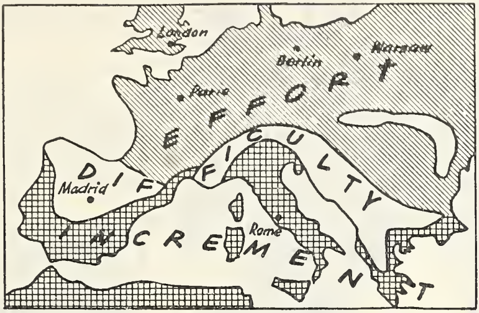

Fig. 3·10. Fleure's human regions of western Europe.

GEOGRAPHIC REGIONS. In most areas, there is a blend of both physical and human factors. In some, the natural landscape may predominate. If that is so, it can be used as the basis for defining the area. Thus north of Lancaster Sound, in Canada's high Arctic, there is a practically manless area. This could well be defined in terms of its tundra climate and rolling to mountainous terrain. In other areas, the natural landscape might still be dominant; yet the significant difference could nevertheless be human as, for example, between the Canadian tundra occupied by Eskimos and that occupied by Indians; or between the boreal zone largely occupied by Indian trappers and that being developed by European pioneers. (See Fig. 3·11, page 48.) It is then up to the geographer to decide whether to include the different cultural or functional areas in the larger natural zones, or split the natural areas in favour of the human regions.

Still other areas will be so dominated by overall cultural or functional patterns that the geographer will tend to delimit them on the basis of the human region. Here again, however, a dominant human pattern might have lesser divisions, harking back to the natural landscape. Thus, if a geographer decided that settled, developed Canada was a major region as distinct from pioneer Canada or primitive Canada, he would certainly want to divide the settled prairies from the settled lowlands of the Lower Great Lakes and the St. Lawrence: their topography, climates, and soils are so different.

The description of the earth, then, rests on recognizing geographical regions from the community of natural and human factors there. One of the most satisfactory descriptions is that of Professor James which combines climate, relief, and culture to produce characteristic regional geographies. (See Fig. 3·12, page 49.) These are (in modified form):

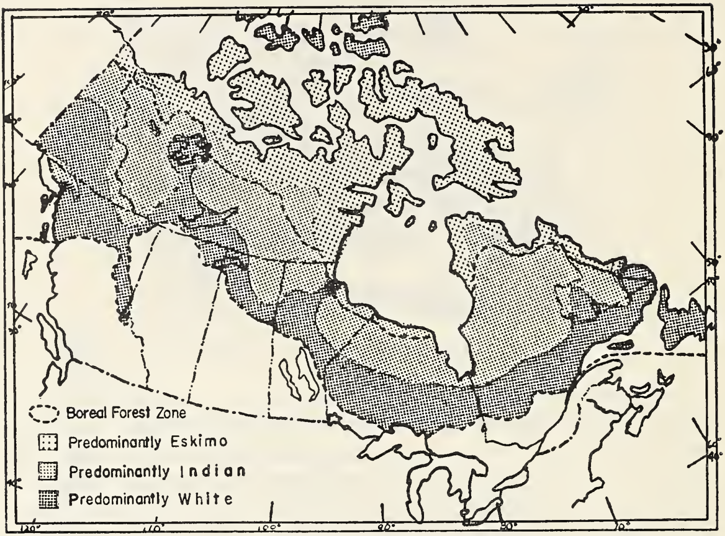

Fig. 3·11. In the tundra and boreal forest zones of Canada are wide areas where the main factor distinguishing one region from another is the human geography. The boreal forest occupied mainly by whites is trenched by the not infrequent road, pitted by mines, scarred by burned-over or cut-over belts, pierced by hydro-electric towers and cleared off here and there for farms and settlements. That part of the forest mainly occupied by Indians suffers few of these modifications; from the air one could hardly see the impress of trapper and hunter. Human geography has still less impact in the tundra, but where it does, it distinguishes between typically white settlements of the high Arctic and the Eskimo camps of the inner archipelago and mainland.

The Dry Lands	The Moslem World and associated subregion The Western World and associated subregion
The Tropical Forest Lands	Regions of primitive development Regions of oriental advanced development Regions of occidental advanced development
The "Mediterranean" Lands	The "home" region of the Old Lands The parallel regions of the New Lands
The Mid-Latitude, Mixed-Forest Lands	Regions of oriental development Regions of occidental development
The Grasslands	Regions of primitive development Regions of advanced nomadic development Regions of sedentary (oriental and occidental) development
The Boreal Forest Lands	Non-occidental regions Occidental regions

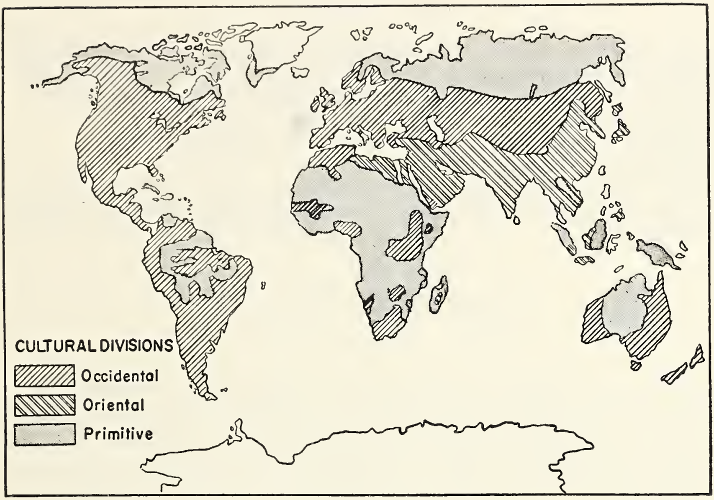

Fig. 3·12. Cultural divisions of the world. (After Preston James)

The Polar Lands	Occupance by Eskimo culture Occupance by the Eurasian cultures Occidental occupance
The Mountain Lands	Differentiation by relief

QUESTIONS

A

1. What is a region?
2. What are the essential differences between natural and human regions?
3. What are the major structural regions of Canada?
4. How do these compare with its major climatic regions?

B

5. Attempt a division of Canada into natural regions on the basis of relief and climate.
6. What are the major economic regions of Canada? (See Figs. 8·1, 8·11, 8·14, 9·4, 10·12.)
7. Do these correspond with its natural regions?
8. In Figs. 3·3 and 3·4 to what extent has the population (a) observed, (b) ignored the natural region?
9. What is a geographical region?

10. The world is made up of a number of distinct regions. What are the most satisfactory ways of identifying those regions?

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CHAPTER IV

World Population

Geography and Population. The distribution of people is a reflection of the influence of both geography and history. People tend to avoid, as much as possible, those isolated areas where it is difficult for them to trade and to communicate with others. Rather, they prefer to collect in accessible areas where all roads come together and from which goods and ideas can readily be traded with others in many different places. Similarly, they generally move from regions that are too cold or too dry, or where rainfall is too irregular, or where the climate promotes harmful diseases, to concentrate in healthier, more reliable, more stimulating, or more comfortable climates.

Thus there are zones of population expulsion and zones of population attraction in the world. In early times, the zones of expulsion lay along the margins of the advancing ice caps or, when the ice was retreating, along the fronts of the advancing deserts. Even after the Ice Age, changes in climate happened not infrequently, with colder or drier years expelling people from the marginal environments to the optimum ones. (See Fig. 4·1.)

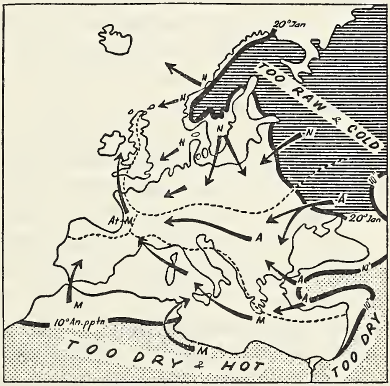

Fig. 4·1. Regions of early expulsion and attraction in the peopling of Europe. People were expelled from areas that were too dry and hot or too raw and cold into the "comfort zone" between.
N ⟶ Nordic movement; A ⟶ Alpine movement; M ⟶ Mediterranean movement; At-M ⟶ Atlanto-Med.; — — — — —main racial divisions.

Consequently, geography has always stimulated migration and the loss or gain of population between negative and positive environments. Furthermore, it has guided these movements, leading people along lowland corridors beside, or between, mountainous areas, taking them around marshes or deserts, by beach-lined coasts, and drawing them along zones of refreshing rainfall and pleasant temperature.

However, a change in physical conditions was not always required to initiate migration. Childe has shown that in both Asia and Africa people moved out of the steppelands, on occasion, towards more humid and propitious climates because they had over-hunted or over-grazed the region. A time came when there was not enough game left, nor pasture for their flocks and herds, and conditions were just as bad as though desert conditions had invaded their homelands. In fact, through the lack of conservation, people sometimes created deserts out of the steppe and had to migrate in search of better conditions.

Peoples' own habits and inclinations have influenced migration. Some folk have actually sought the refuge of isolated, difficult regions so as to get away from the competition of their fellows and live their lives relatively unchanged, in quiet seclusion. To do this they have faced all kinds of privations, refusing to benefit by the ideas and techniques of those who have progressed to better and safer ways of living.

Some folk stress the worship of their ancestors or of the past, in general, to such an extent that they are never happy in foreign lands. Indeed, many of them refuse to migrate even when opportunities in the homeland become fewer and more difficult to secure. In certain cases, the ideology of a state refuses to let its people migrate; it is so concerned with keeping itself and them intact.

On the other hand, there are examples of restless, adventuresome people who, at least in periods of their history, have seemed to love moving because of a deep pioneer urge. President Wilson once spoke of "the swarming of the English", and the English do seem to be one of these restless, energetic types that, while building up their own home and land, also have "fallen in love with long distance". Very early, they moved from nordic lands in northern central Europe to the coasts of western Europe and so to England. Then they colonized the outer parts of the British Isles and, before completing this, launched out upon the high seas to establish their world-engirdling Commonwealth. (See Fig. 4·2.)

In this event, the people themselves have created the geography of their fortunes. They have, through their migrations, linked up one set of lands with another, and so bound them together to share a common economy, enjoy a common culture, and express a common loyalty.

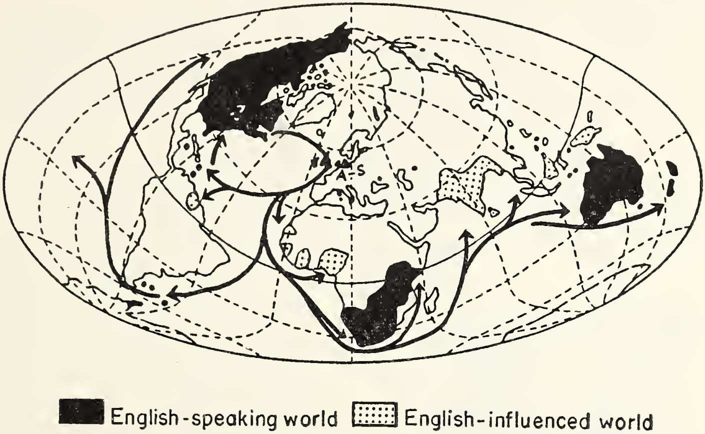

Fig. 4·2. The "Swarming of the English".

These factors are, then, vitally important in determining their own and the world's geography. The English became traders and manufacturers rather than herdsmen and farmers; their population shifted from country to city; they relied on foreign imports for food and raw materials, and on foreign markets for their manufactured goods; they changed political frontiers and the strategy of the world in relation to their successes or failures at home and abroad.

In the same way the French, made up from wandering Celts and Franks, found themselves pressing on and out. In dynamic periods of their history, they also built up world connections of empire, trade, and culture, making a deep impression upon North America, the West Indies, North Africa, and south-eastern Asia. They too, while originally controlled by their geography, gradually came to reinterpret that and to make a new geography from their ambition, courage, and endurance.

Factors in Population Growth. Thus, reflecting both the natural environment and human needs, the world's population has grown considerably since the days of early man. Then a few hundred thousand, at most, inhabited the parklands of southern Asia, southern Europe, and northern and eastern Africa. Today nearly two and half billion people live on the earth, in nearly all its regions. The increase, however, has not been regular or consistent: it has been by a series of great surges here and advances there, followed by periods of quiescence or even relapse.

Looking over the whole of human history there seem to have been forward upswings in population first at the birth of the New Stone Age,

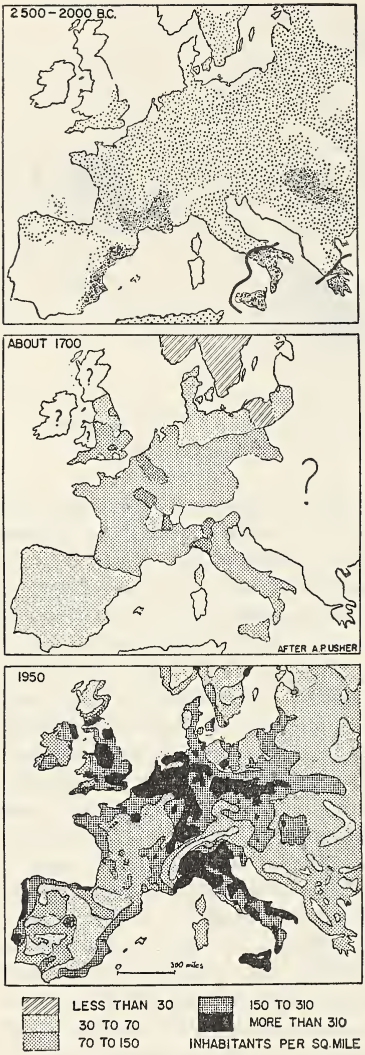

Fig. 4·3. Distribution of population in Europe in neolithic, mercantile, and industrial times. Key is for lower two maps.

associated with the Discovery of Agriculture, then in the Age of Maritime Discovery, and finally during and since the Industrial Revolution. In other words, population has grown with the development of new and much more productive technologies (new stone implements; steam power; electrical power and nuclear energy); or with the rise of better organized and more productive economies (agriculture, instead of herding and hunting; a cash economy based on industry and trade, instead of a subsistence one based on agriculture and local production).

In each of these periods, the increase in population occurred in places most suited to the spread of the new ideas and development of the new economies. (See Fig. 4·3.) The Neolithic population grew up in western and southern Asia, southern Europe, and northern Africa, where the new ideas could spread most rapidly. Here agriculture was assisted by the Mediterranean and monsoon types of climate, and became the basis of the old civilizations of Egypt, Greece and Rome, India and China. Agriculture then spread to the west maritime climate, with the rise of Britain and France; next to the temperate steppe and the east coast cool temperate climates, with the expansion of Russia, Manchuria, and Japan, and the opening up of eastern North America.

The Maritime Age led to the rapid growth of population in the trading centres of the Mediterranean; then in western Europe, and parts of Scandinavia, and later in New England and the mid-Atlantic colonies (subsequently States) of America—all areas with exceptional opportunities for maritime trading. In a similar way, industrial populations grew up in those trading countries that, in addition to having easy access to raw materials and markets, also had large deposits of iron and coal from which to make and work their industrial machines. So the dense populations of England, western Europe, central and southern Russia, north-eastern North America, and Japan expanded in modern times.

Population Composition. Advances in techniques and in organization seem to be reflected in population growth largely because there are more opportunities, more food, and greater security for people. The birth rate rises. People are willing and even anxious to have more children. They feel they can support them and that they will, in turn, support and strengthen the family. The **birth rate**, or the number of people born every year, in proportion to every thousand of the population, is a good sign of population change. However, it is qualified by the **death rate**, or the number who die in proportion to every thousand of the population. This includes those who die of old age, those who die of disease and by accident and, also, infants. **Infant mortality** is very important in population change. The **net rate of natural increase** is that number of births which exceeds deaths per thousand of the population. The **net rate of natural decrease** is that number of deaths which exceeds births per thousand of the population. The **total net increase or decrease** takes in the factors of emigration and immigration.

Some nations, in spite of a high birth rate, have a high incidence of child mortality and a high death rate; therefore, their population does not grow very much. Those which really grow fast are the nations having a high birth rate, a low death rate, considerable immigration, and little emigration. Industrialized countries usually have a high net increase in the early stages of their development. Later, however, as machines compete with hands for work, and as people are concerned somewhat more with making a *comfortable* living than with simply making a living, the birth rate falls off, immigration slackens, and the total net increase begins to drop. For a period, great improvements in medical science and social conditions in these countries progressively lower the death rate and so preserve an actual increase of population. Eventually, however, the point is reached where the diminished birth rate falls below that of the death rate and the population as a whole begins to decline.

In less industrialized nations, the death rates remain high and population does not increase greatly. Amongst primitives who come into contact with outside diseases but do not enjoy increased opportunities through external relations, the death rates are often well in excess of the birth rates, and many such people are gradually disappearing.

The population may change its *composition*, as well as its *size*, with changes in economy and development. Countries, like Canada, that are still being newly developed tend to attract many more male immigrants than female and so they have an unequal **sex balance** with a distinct preponderance of males. In other countries, like Britain, from which young men are migrating, there may be a preponderance of females. Britain and France also lost so many men in the first and second World Wars that the female element in their population became dominant.

Also in countries such as Canada, which are young and dynamic and are attracting fresh waves of immigration decade after decade, the **age balance** may see a distinct dominance of youthful elements. In Britain and France, on the other hand, there are many more old people, and the population is an aging one. This is partly due to the emigration of many of the young men to Canada, Australia, New Zealand, and elsewhere. It is also due to a low birth rate which, having dropped off rather steeply in the last thirty years, is not sufficient to keep the balance with the growing number of old people. Then again, the factors that have increased the **life expectancy period** have kept many people alive and given them a longer old age than was customary before. Their death in great numbers may sharply reduce the population.

Although western Europe is, on the whole, becoming more feminine and aged in its population, it at least does not suffer the ethnic problems that face a nation like Canada, which owes its rapid expansion very largely to immigration. The **ethnic balance** in our country is constantly being altered. Once predominantly British in origin, Canada is now just less than half British. The French-speaking people have increased their proportion of the population slightly, to about a third. But the element that is expanding most is the European segment derived from countries other than Britain or France. (See Fig. 4·4a and b.) Compared with the great ethnic diversity of our population is the relative homogeneity of that of Britain and France. Diversity, however, should ultimately broaden our culture and enrich our national life.

THE DISTRIBUTION OF WORLD POPULATION

Areas of Dense and Sparse Population. The areas of the earth with the densest populations are (i) in monsoon and temperate east and south Asia, especially where, in addition to the favourable climate, there are

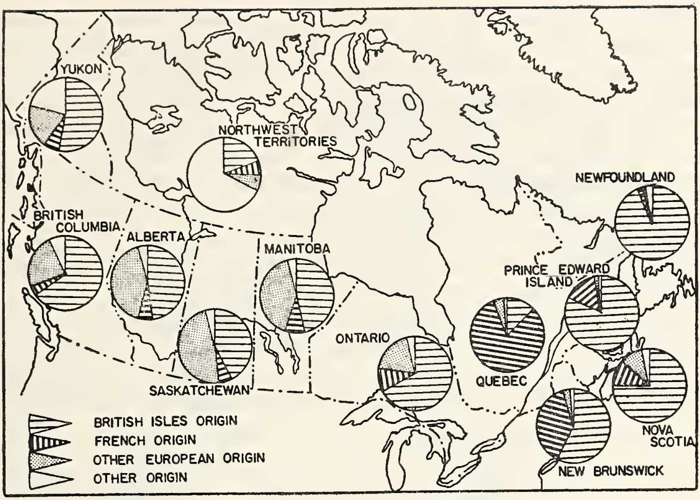

Fig. 4·4a. Ethnic groups of Canada in percentage of total provincial population, 1951, are shown above.

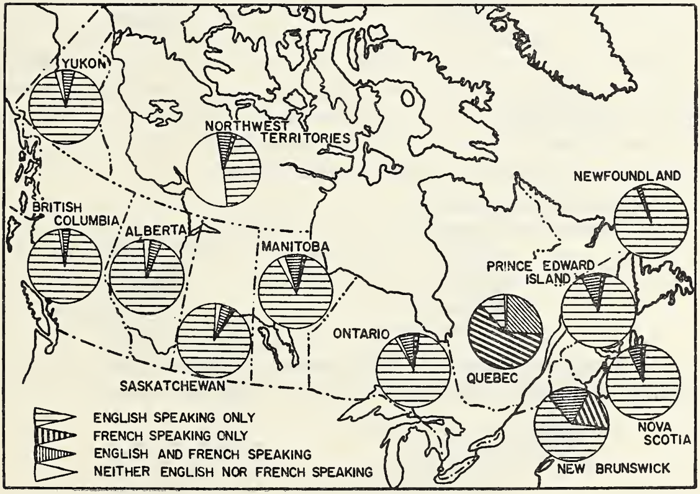

Fig. 4·4b. Ethnic diversity in Canada as reflected in the language spoken, 1951.

considerable mineral and fuel deposits; (ii) in Mediterranean, central, and western Europe, where again, climate and mineral deposits combine to provide a suitable basis for development; and (iii), though to a smaller extent, in eastern North America, where very great wealth in minerals and fuels goes along with a healthy, stimulating climate in the zone of the temperate cyclones. Areas with moderate density are eastern Europe, western Asia, west Africa, the West Indies, and Central America. Sparsely populated are the lands of northern Asia, Africa (except for West Africa and Egypt), northern North America, South America, and Oceania. These are mainly lands that have cold, dry, or selva climates, or that are isolated. (See Fig. 4·5.)

Of the major regions, monsoon Asia has the greatest number of people, with ten countries of over ten million people, and with the two most heavily populated countries of the world within its orbit. Altogether it has over 1,290,000,000 people, or about half the world's total.

LEADING MONSOON COUNTRIES	THEIR POPULATION
China	583,000,000
India	357,000,000
Japan	83,000,000
Pakistan	76,000,000
Indonesia	60,000,000
Vietnam	26,000,000
Korea	25,000,000
Philippines	19,000,000
Burma	17,000,000
Thailand	17,000,000

Eastern Europe and the U.S.S.R. rank next amongst major regions, with five countries of over ten millions, and a total population of about 290,000,000. Most of this is concentrated in the great plain between Czechoslovakia and the Urals, but an important, though tenuous, tentacle of population reaches across southern Siberia.

LEADING EASTERN EUROPEAN-SIBERIAN COUNTRIES	THEIR POPULATION
U.S.S.R.	214,500,000
Poland	25,000,000
East Germany	18,000,000
Rumania	16,000,000
Czechoslovakia	12,000,000

North-western Europe, the third major population region, has four countries of over ten millions, and a total of about 190,000,000.

LEADING NORTH WESTERN EUROPEAN COUNTRIES	THEIR POPULATION
United Kingdom	50,000,000
West Germany	48,000,000
France	43,000,000
Netherlands	10,000,000

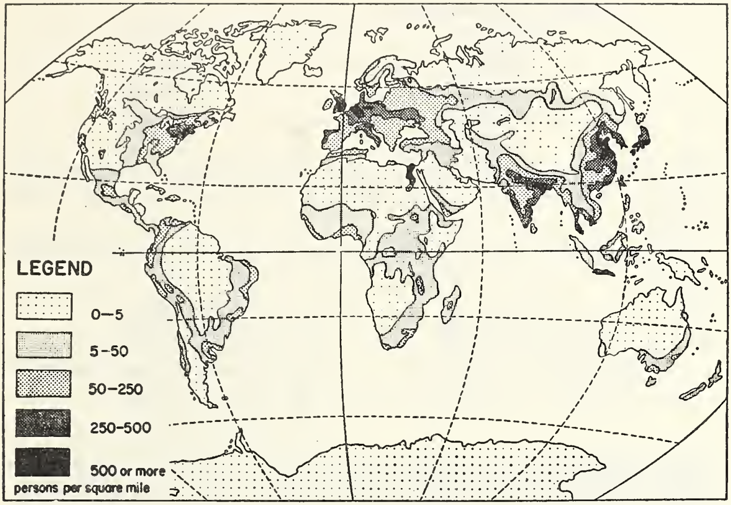

Fig. 4·5. Densely and sparsely populated areas of the world.

Anglo-America, the world's fourth most populous region, was slow to develop, compared with Europe and Asia, though it is now one of the most rapidly expanding areas of all and has already achieved the total of 186,000,000.

ANGLO-AMERICAN COUNTRIES	THEIR POPULATION
The U.S.A.	170,000,000
Canada	16,000,000

The Mediterranean lands form the fifth major population region, with five countries of over ten million and a total of about 170,000,000. The Mediterranean long paralleled monsoon Asia as a centre of dense settlement and vigorous national development, but was surpassed by northwestern and then by eastern Europe with the onset of the industrial revolution.

LEADING MEDITERRANEAN COUNTRIES	THEIR POPULATION
Italy	47,000,000
Spain	28,000,000
Turkey	21,000,000
Egypt	19,000,000
Yugoslavia	17,000,000

Latin America is likewise expanding rapidly and has four countries with ten millions, or more, and a total of about 114,000,000.

LEADING LATIN-AMERICAN COUNTRIES	THEIR POPULATION
Brazil	52,000,000
Mexico	26,000,000
Argentina	16,000,000
Colombia	12,000,000
Venezuela	5,000,000

Oceania and Australia form the last of the world's peopled areas, with a total of approximately 13,500,000. Of this, Australia accounts for 8,000,000.

Taking single countries, the most populous nations of the world are, in order:

A. GIANT NATIONS

(1) China, 583,000,000
(2) India 357,000,000
(3) U.S.S.R. 214,500,000
(4) U.S.A. 170,000,000

B. LARGE NATIONS

(5) Japan 83,000,000
(6) Pakistan 76,000,000
(7) W. & E. Germany 66,000,000
(8) Indonesia 60,000,000
(9) Brazil 52,000,000
(10) United Kingdom 50,000,000

The Asiatic countries owe their development largely to well-watered plains and the monsoon climate, together with a considerable diversity, though no great quantity, of mineral products. Russia and America have extensive plains with fertile soil and huge deposits of coal, oil, iron, and other valuable commodities. Germany and Britain, though limited in size, have a moist, equable climate well suited to intensive agriculture, and possess large amounts of coal and many minerals; their command of continental and maritime routes is important. Brazil is huge, and has many mineral deposits, a fertile litoral and, in the south, a pleasant and productive climate.

Size, however, is not the only significant factor. An examination, not of the total figures but of the number of people per square mile, gives a rather different picture.

Two areas are particularly densely populated; they are Britain and the Low Countries on the one hand and Japan on the other. These are the only regions with a density of more than 500 per square mile.

(1) Netherlands: 811 per sq. m.
(2) Belgium: 735 per sq. m.
(3) Japan: 585 per sq. m.
(4) United Kingdom: 538 per sq. m.

All of these relatively small countries are endowed with commanding positions, enabling them to take maximum advantage of Atlantic and Pacific trade routes and of the rich hinterlands of west Europe and the Far East; in addition, they possess mild, moist climates and very fertile, if small, plains. In Britain, Belgium, and Japan, fuels and minerals have provided additional advantages.

Countries with a medium-high density of population of over 250 people per square mile, are Germany (495 per sq. m.), Italy (400 per sq. m.), Korea (348 per sq. m.), and India (293 per sq. m.).

It will be noted that, all in all, the really densely-settled and intensively-developed areas of the world are western Europe (See Fig. 4·6.) and monsoon Asia. Compared with them, the Americas are only moderately or even quite sparsely settled. Mexico with 122 per sq. m. is the most densely settled country of any size. (Though not comparing with industrial Europe, it does compare with peasant Asia; China, 120 per sq. m.) The United States of America has a mean density of 49 per sq. m.; Argentina of 15; Brazil of 15; and Canada of 3. (See Fig. 4·6.) Actually the mid-Atlantic, northern central, and north-eastern States, together with Southern Ontario and Southern Quebec, have a moderately dense population, but when the American desert and the Canadian barrens are taken into account, the average densities are lowered and are much

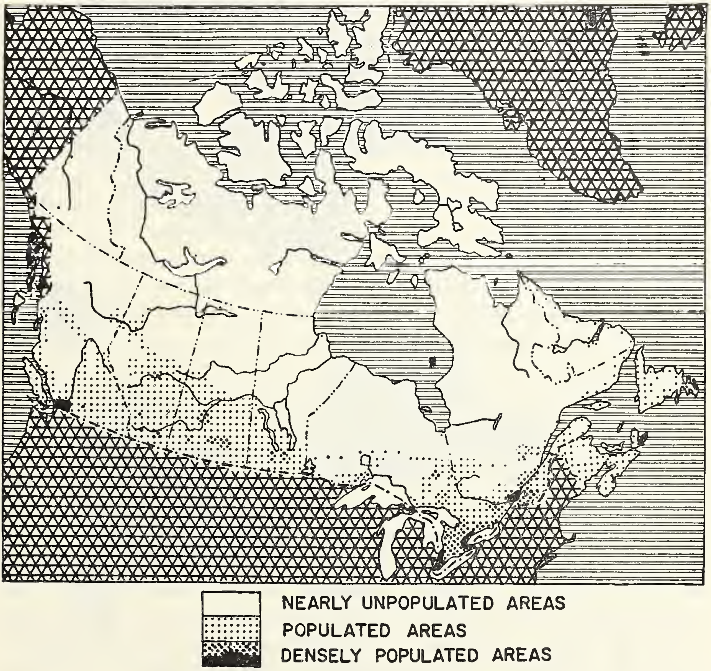

Fig. 4·6. Sparseness of Canadian population.

below those of the crowded countries of southern and western Europe or south-eastern and eastern Asia.

Underpopulation and Overpopulation. Although the Americas seem to offer more scope for future populations than do Europe or Asia, it must not be thought that Canada or the other American countries are grossly underpopulated. The terms underpopulation and overpopulation are purely relative. The American countries might be considered underpopulated were they to be content with peasant settlement and a very low standard of living, as in parts of Asia, or were they prepared for the vast industrial and slum population of parts of Europe. Since it is obvious that they have avoided crowding many small landholders on their agricultural land and many slum dwellers into their cities and have, instead, given ample land to the farmer and a high standard of comfort to the city dweller, they have not any too much space for their people. The main exception is the North. Yet it seems to be the policy to expand into this area only as the economy expands. Consequently, it may be taken that for their highly mechanized economy and the space which they require for its operations, and in light of their high standard of living, the Americas are not necessarily underpopulated. Yet they have room left, if required, for considerable future development.

Areas of Increasing and Decreasing Population. The population of the world is increasing nearly everywhere, and it is increasing rapidly. A century ago, the world's population was just about 1,000 millions. Today it is over 2,400 millions. It is said to be increasing at the rate of about 20 millions a year. This is, roughly, 60,000 a day!

At present, through efforts at conserving resources, increasing food yields, colonizing new land, and mechanizing labour, it is possible to support this population, though by no means at a desirable standard of living for all. One of the gravest problems of the next generation will be to find enough food and work to maintain the world's population at anything like a reasonable level of life should it continue to increase.

The world's population is not increasing in an even way. Some areas are expanding rapidly; others are barely holding their own; still others are showing signs of a potential decrease. The areas with the highest average annual increase (shown as a per cent of their population) are, Latin America, monsoon Asia, and eastern Europe and Siberia. They are followed by Anglo-America and the English-speaking countries of the Commonwealth. All these are showing active increase. Behind them come northern Europe and the Mediterranean, that are just holding their own. Finally are Britain, Ireland, and France that have only a very slight increase or may even have a decrease in their population. (See Fig. 4·7a and 4·7b.)

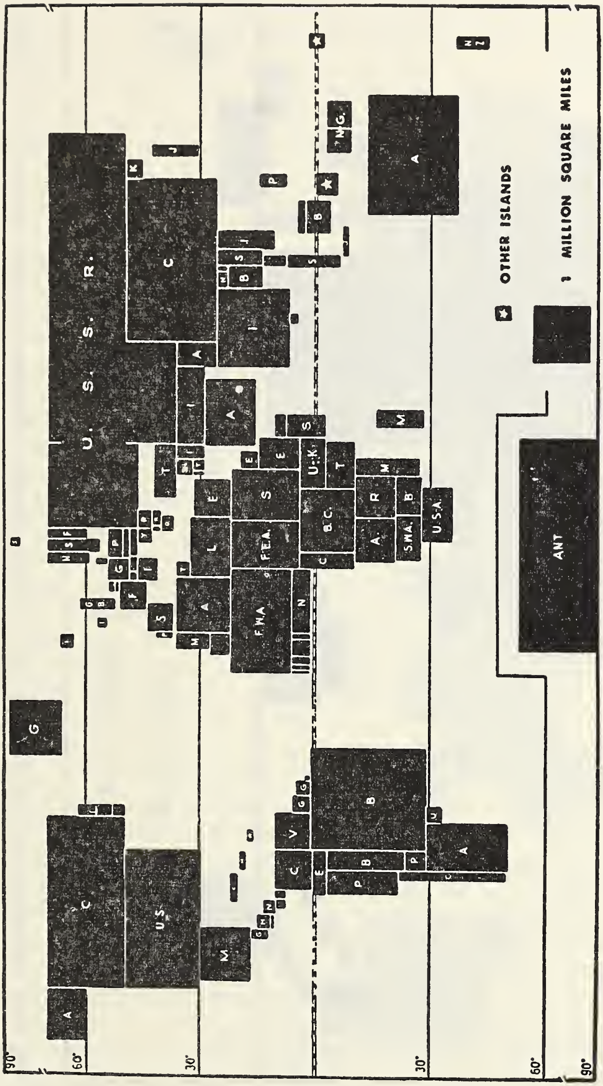

Fig. 4·7a. World land distribution.

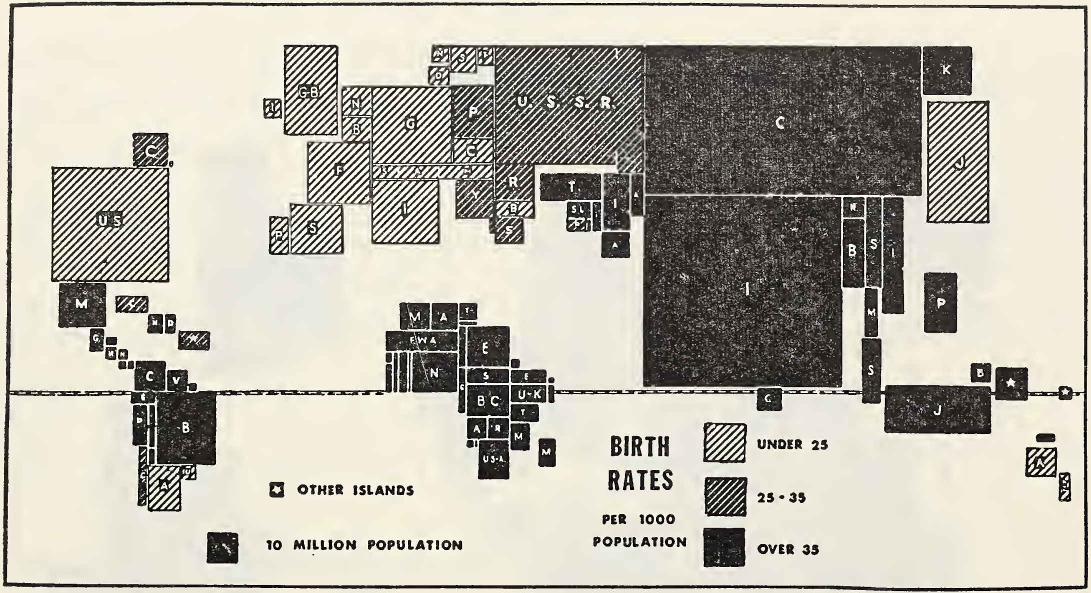

Fig. 4·7b. World population distribution together with an indication of likelihood of increase based on 1952 birthrates.

LATIN AMERICA has by far the highest increase, with percentages generally in excess of 2. (Venezuela, 2·91; Brazil, 2·53; Mexico, 2·48.) This is due to a high birth rate, a youthful population, well-balanced population, a notable decline in recent decades in infant mortality and the death rate and, in some cases, to active immigration. Fortunately, there is still ample room to support the growing population.

MONSOON ASIA also has a high increase, ranging from 1·25 to 2% per annum. (Korea, 1·99; Siam, 1·89; Ceylon, 1·51; India, 1·25.) This has resulted, not so much from an increase in the birth rate, which was always high, but from a very substantial drop in the death rate due to improvements in health and other conditions. Here the problem of finding food for the increasing millions is one of the must crucial in the world, since, as a comparison with figures on density will show, these lands are already densely settled and offer little room for more people.

EASTERN EUROPE AND THE U.S.S.R. have a moderately high increase of population, with annual average percentages of from 1 to 1·5%. (Poland, 1·38; Rumania, 1·17; U.S.S.R., 1·14.) Eastern Europe is just beginning to catch up now with western Europe; it is experiencing the sort of agricultural and industrial revolution today that the western countries had in the nineteenth century. As Britain and France then forged ahead, with better food and more work for the people and a sense of living in an expanding economy, so the U.S.S.R. and her satellites are beginning to advance. Having a low density of population, much space, and many resources, they still have room to expand. Recent birth rates are high.

THE UNITED STATES OF AMERICA, CANADA, AND THE ENGLISH-SPEAKING COUNTRIES OF THE COMMONWEALTH also show a moderate to vigorous increase, with percentages of from 1 to 1·75. (The Union of South Africa, 1·75; Canada, 1·6; U.S.A., 1·36; Australia, 1.) These all have youthful, dynamic populations with a rather high birth rate; they all stress good diet, good housing, sanitation, and medical care, and so have low infant mortality and death rates; they enjoy active immigration; they offer opportunities, resources, and space for their growing populations.

NORTHERN EUROPE has a low increase of between ·75 and 1%, mainly due to a falling off in the birth rate and to prolonged emigration. Were it not for the very low death rates, associated with the widespread social services typical of those countries, the net increase would be even lower.

SOUTH-WEST EUROPE has a low rate of increase of between ·5 to 1% of the population per year. Here the birth rate, though high, is matched by a relatively high death rate. Also, since these lands are already crowded and do not have new resources to offer their people, they are centres of emigration. This is particularly true of Italy (·66%).

THE BRITISH ISLES AND FRANCE are, as far as population is concerned, countries on the decline. (The United Kingdon, ·44; Eire, ·03; France, ·34.) Their rapidly aging population, their predominance of females and lack of males, their dwindling birth rate, which cannot be offset by any further cut in the death rate and, in the case of Britain and Ireland, the emigration of many of their most adventuresome and their younger men, all contribute to this situation. Of course, it should be remembered that they are already well populated for their size and, in fact, could stand a large increase in population only with difficulty. Even now their resources are taxed to the limit.

Canada's position in the world population picture is enviable. The middle-sized population is adequate for the development of existing resources, and provides a fair market both for home production and international trade. It shows an active increase thanks to a moderately high birth rate, low infant mortality and death rates, and a substantial net gain of immigration over emigration.

Canada is, it is true, rather too masculine a country and this has its effects on the way of thinking of its people and on their social life and customs. It is, however, a distinctly youthful country, with all the vigour that goes with a high proportion of men and women in their twenties and their thirties. This, too, deeply colours the psychology of the nation which is, distinctly, one of a forward look. The density of population is nowhere great, and there is substantial room, together with many untapped resources, for considerable further development. This knowledge gives Canadian people a certain confidence and assurance, a forcefulness and initiative, that are outstanding traits in the national character.

QUESTIONS

A

1. In Fig. 4·5, which are the areas in the world with the densest population and which with the most sparse?
2. Which continent is the most fully settled? Which the least?
3. What four areas of Canada may be said to be densely populated? (Fig. 4·6.)
4. About how much of Canada is all but unpopulated?

B

5. In Fig. 4·7, what are the main contrasts between size and population, i.e. which countries have a much bigger population than size, and which countries have a much bigger size than population?
   Note how Eurasia swells on the population map, whereas the Americas, Africa, and Australia shrink. Judging from the present birth rates what is likely to be the situation in the future?

6. What made the dry and cold climates shown in Fig. 4·1 expel the peoples that had formerly lived there? Compare with Fig. 2·8.
7. Name the main streams of migration resulting from the "swarming of the English". Which are the English speaking countries of the world? In which other countries is English an important language?

C

8. Refer to an atlas for a physical map of Europe. Compare this with the maps in Fig. 4·3, and name for each map the areas with (a) the densest, (b) the most sparse population.
9. To what extent do lowlands correspond with the dense population and highlands with the sparse population? Is the influence of relief as evident today as it was formerly?
10. What proportion (roughly) of the following continents is sparsely populated: North America, Europe, Asia, South America, Africa, Australia, Antarctica? Range the continents in order of sparsity of settlement.

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CHAPTER V

Man in Humid Tropical Lands

General Reactions. In the development of population and, indeed of human geography as a whole, one of the main factors has been man's reaction to climate. Life is different in each climate. People eat different foods, wear different clothes, live in different houses, have different working habits, play different games, and possess different symbols in their art and religion. As the old verse has it:

What is it moulds the life of man?
  The weather.
What makes some black and others tan?
  The weather.
What makes the Zulu live in trees
And Congo natives go in leaves,
While others go in furs and freeze?
  The weather.

This is an exaggeration, but it is not far off the mark. Men adjust closely to their climate. In the rainy tropics, they live to avoid heat and humidity. (See Fig. 5·1.) They make use of the plentiful plant life. They have to take precautions against fevers and other diseases. They drink a good deal and eat plenty of vegetables and fruit. Because of the difficulty of "keeping" their food, they season it well. Since their bodies use up a great deal of salt, they like well salted food: this helps them to endure the heat. (Salt tablets are issued to soldiers stationed in the tropics.)

People live in houses built for shade, with narrow windows, often having shutters which can be drawn across them in the day. Houses have wide, shady verandahs and also overhanging eaves, to shed the rain. They are generally built of wood and thatched with palm or rafia, but many are made of brick dug from the red lateritic soils. (See Fig. 5·2.)

Clothing is characteristic. A lot of white is worn, which helps to keep out heat (black absorbs it). Brightly coloured clothes, to match the brilliant flowers of the jungle, are common. People dress lightly and,

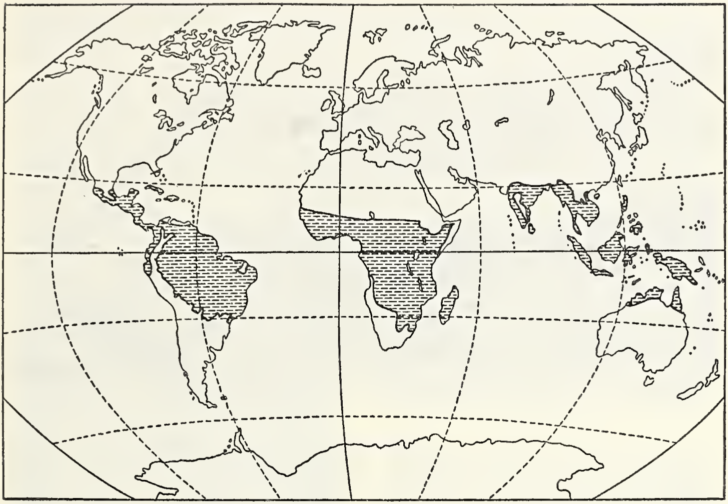

Fig. 5·1. The tropical humid regions of the world.

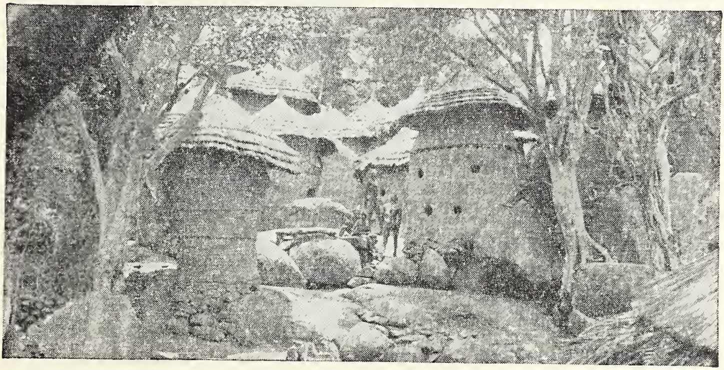

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Fig. 5·2. Houses in the humid tropics generally have conical, steeply pitched, heavily thatched roofs with wide eaves to shed the rain. Some have wooden walls plastered with mud or laced with lattice work, and either no windows at all, or only the smallest of apertures in order to keep the interiors shady and cool. The homes shown above are in northern Nigeria. Note the virtual absence of clothing of the inhabitants.

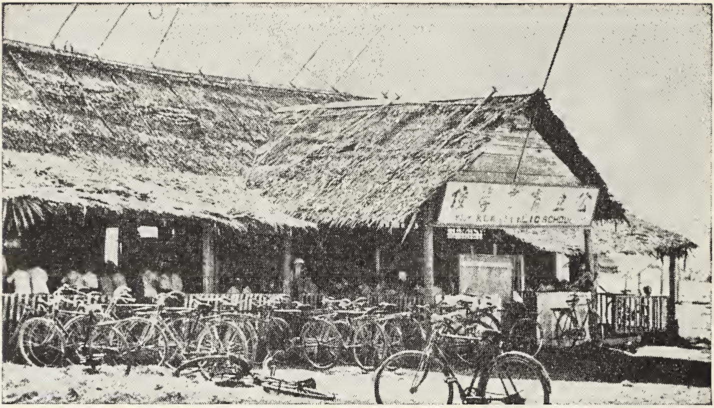

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Fig. 5·3. Tropical houses frequently have open sides, instead of walls, to allow possible breezes to pass through them. This Malayan school is typical. Note the prevalence of white shirts or shirt-blouses on the school children. White helps to keep out heat; dark clothes absorb it.

where custom permits, go around half clad, with only a loin cloth or a cotton shirt. Wide-brimmed hats are worn as protection against the sun. Capes or umbrellas are carried because of numerous showers. (See Fig. 5·3.)

Men and women like to get up early, often while it is still twilight before the dawn, in order to work in the cool of the day. During the hot noon hours, they frequently retire for a **siesta**, to resume work again only in the late afternoon. When evening comes, things are lively with social visits, dancing, and games. Indeed, life fluctuates according to the diurnal rhythm rather than the seasonal rhythm of temperature.

Various ways are used for earning a living. The humid tropics may be divided into landscapes with primitive economies and landscapes with oriental or with occidental land practices.

PRIMITIVE CULTURAL LANDSCAPES

In general, these are landscapes where man has not made any sweeping alterations; where, instead of adapting the land to his needs, he has adapted himself to the land. In most of them, man is a refugee who has fled the competitive struggle with others and sought the shelter of the forest. Few things could better isolate him. The density of the jungle in either the selva or monsoon climates makes an ideal screen. Behind it the primitive may carry on his occupations and way of life with little fear of interruption. Naturally he comes out to contact civilized communities when he is in need; trade is carried on; part-time employment often sought. Yet basically the primitive is on the retreat and likes to keep to the hidden fastnesses of the forest.

Collectors and Hunters. The most primitive people are those who earn their living by collecting wild seeds, roots, and fruits, and by hunting wild game. For them the forest is a generous home. In it they find ample stores of food, and a never-failing supply of material for their houses, tools, and clothes. However, it is both dangerous and difficult, and attacks them with its fatal diseases.

Such people live in small communities in Guiana and Amazonia, in West Africa and the Congo, in parts of Ceylon and the forested hills of India, in Malaya, the East Indies, New Guinea, and scattered parts of Oceania. They have many customs and beliefs common only to their locality, and yet possess a few general characteristics.

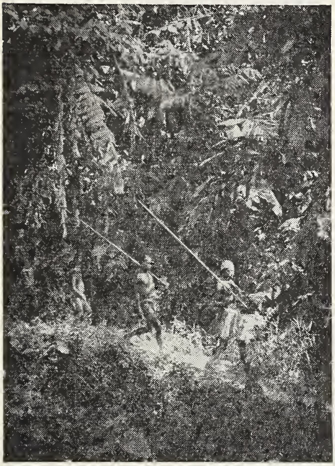

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Fig. 5·4. Primitive Sakai hunters in the dense Malayan forests hunt with long blow guns, through which darts are blown at birds or monkeys in the trees. In the damp heat little clothing is needed.

They live in tribes or clans where most of the families are closely related to each other. The tribe owns the land in common and when it moves, migrates as a group. There are few, if any, private trapping lines or fruit groves, as labour is not specialized to that extent. Instead, the men usually split up into hunting teams and go through this quarter or that quarter of the common land. (See Fig. 5·4.) When they return, they share the trophies of the hunt among all the families. They often erect a common turtle pen, or make weirs together, and trap or spear fish there. Thus they can depend on some return for their labours.

Women go out to a patch of manioc or yam or to taro swamps and together pull up the succulent roots, or visit banana and other fruit trees in the jungle. When they return, each prepares enough for her own family. They take the children with them, carrying their babies strapped or slung on their backs or astride the hip. The older children help in the daily task of food collecting.

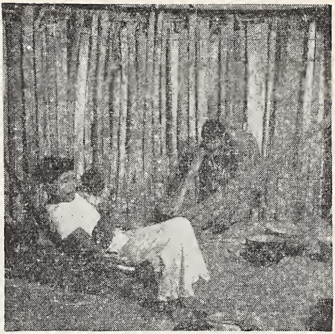

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Fig. 5·5. Interior of an Indian house in hot, humid jungles of Central America. The walls are made of split trees, joined loosely together to allow a free movement of air, and yet offer adequate protection. Furniture is at a minimum; hammocks serve for beds, slung on poles above the earthen floor. A cotton shirt and trousers for the men and a cotton or grass skirt for women are typical attire.

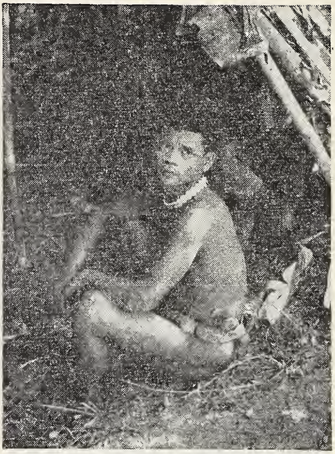

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Fig 5·6. A Sakai man and his family in their lean-to, or overnight shelter, built of palm fronds on the windward side, roughly woven together and leaned against upright stakes.

The men erect the houses, the women helping them with various kinds of lattice work. In some communities in Amazonia, a large circular communal house is built. (See Fig. 5·5.) Inside are two circles of wooden pillars between which the several families hang their sleeping hammocks. The whole is roofed over with palm thatch, prominent eaves being left to shed the frequent rains. The walls of the house are made of matting, sometimes plastered with mud.

In West Africa, several large family homes are built, again circular in form, where a number of related generations live and sleep. The steep, conical roofs plunge outward in wide eaves. The walls of matting can be rolled up by day for ventilation and then tied down at night to keep the insects out. Much less pretentious homes are also common, especially among migrant collectors.

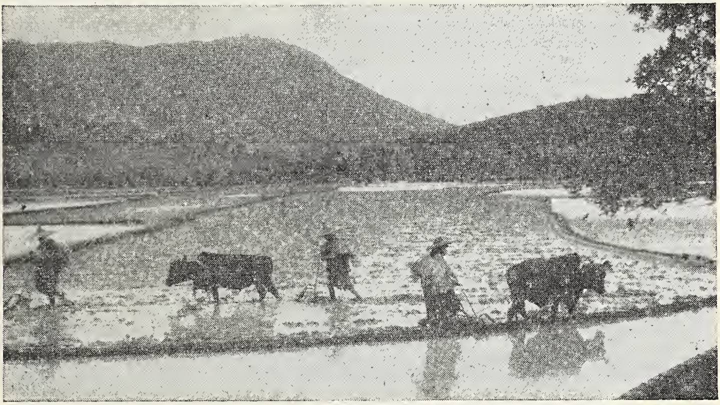
In Malaya, the primitive collectors move around so frequently that permanent homes may not be used: many people prefer temporary "lean-to's" that can be put up quickly and then discarded. (See Fig. 5·6.)

The use of communal or large family homes greatly reduces the amount of work in clearing the forest and in keeping it back. The fewer the individual homes, the more the work is shared and the easier the task for the individual. Then, too, communal homes or small compact villages are more easily defended against prowling jungle animals.

Tools, like the houses, are made chiefly from plants. Spear hafts, paddles, traps, darts, and other hunting equipment are cut from the forest. Nets, containers, baskets, hammocks, and household goods are made from palm fronds or rafia. If iron spears and arrowheads, axes, knives, or pots are required, they are generally traded for. Few primitive collectors can afford to keep a class of craftsmen but tend to make and repair their own tools and equipment. Division of labour and specialization in skills are not far advanced.

Clothes are suited to the climate. Custom nearly everywhere permits children to go about unclothed and young people and adults to be half clad. A breech cloth for men and a short leather or rafia skirt for women are the common wear. In addition, however, Amazonian tribes wear a leather cape against drenching rains, and tribes in south-east Asia a cape of leaves. (See Fig. 5·7.) Constant heat and humidity reduce the need for body cover to a minimum. The fact that communities are small and that everyone knows everybody else and may be partly related to them, and also the fact that few strangers are met, explain the lack of any sense of shame at going uncovered.

Lush vegetation, availability of fruits, tools, clothing and housing materials are conducive to an easy type of existence. However, it is not idyllic. Fruit trees are scattered. Collecting edible roots often entails going through snake-infested swamps. The hunter of game may



Ewing Galloway

Fig. 5·7. During the summer monsoons, peoples of south-eastern Asia wear wide-brimmed hats and capes made of bamboo leaves to shed the frequent showers.

himself be hunted by savage carnivores. Jungle fevers are not infrequent and are often fatal. Thus there is a high fatality rate; many children die in infancy; many individuals are killed before they reach old age. Consequently, population has been kept low.

The tribes are small. There is no opportunity for a wide range of occupations or interests. Social classes and groups are not well developed, although divisions into age groups and marrying groups are common. There is not much scope for individual choice and initiative; even marriage is usually restricted to individuals whose relationship is determined by the family or the tribe. Tribal solidarity is very marked. Religion often consists of worshipping the tribal totem or the guardian spirits of the tribe. Festivals are usually on a tribal or village basis and, in all the great crises of an individual's life—birth, puberty, marriage, procreation, and death—the tribe rallies around and participates through one kind of rite or another. (See Fig. 5·8.)

Migrant Agriculturists. People who are more advanced in culture prefer to rely on agriculture instead of collecting. It gives them a more assured food supply, often for less work, or at least less strain. However, there are some quite primitive agriculturists who have scarcely passed the stage of gardening. They use very simple instruments, such

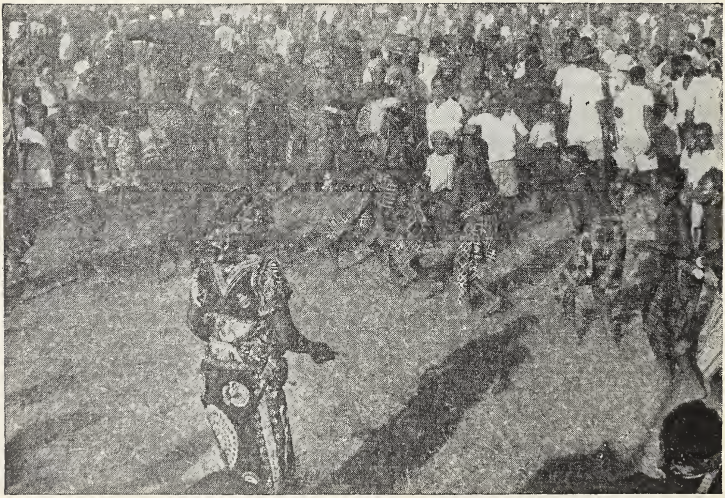


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Fig. 5·8. Group participation is very strongly marked among primitive peoples. Here a general tribal meeting is made the occasion of a festive dance in Nigeria.

as a pointed stick for digging and planting, or the hand hoe (See Fig. 5·9.) instead of the horse-drawn or ox-pulled plough. They choose a site that seems to be fairly open and has an easily worked soil. They burn off the wood, spreading the ashes around as a natural fertilizer. Then from their village of wood and thatch huts, they go out each day to hoe their gardens, where they raise yams, gourds, beans, and corn.

These supply them with their basic diet, but they also go into the surrounding woods to collect fruits, to trap, and to hunt. The women do the work in the plots; the men clear the forest, hunt, and fish. Activities are closely related to the climate. (See Fig. 5·10, page 76.)

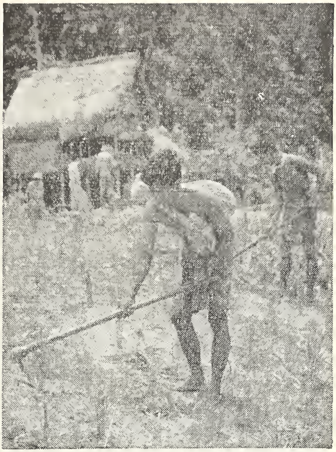

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Fig. 5·9. Primitive agriculturists, such as these Sakai of the Malayan jungle, work their tiny clearings with a hand hoe. Ploughs, harrows, and reapers are unknown, although occidental officials like those in the background are introducing new and better methods of farming. Contrast the clothing of the natives and of the whites. Note the type of home.

After several years, the plots near the village become exhausted. No rotation of crops is practised. Land is not fallowed or rested. No further application of fertilizers is made. The soil loses its productivity, and the people have to plant and hoe new plots a little farther out. After a few years, these become exhausted. Then the gardens are moved out again.

Eventually such a wide area around the village becomes so exhausted in this way that the food supply dwindles, or the people have to spend too much energy travelling back and forth to distant plots each day. Consequently, they decide to migrate, en masse, to a new locality. Finding land that is unclaimed and undeveloped, they migrate there, burn down a big circle in the forest, build their huts in the centre, spread the ashes about, and start a new round of putting in their little garden plots.

This type of migratory agriculture is carried on in many parts of the humid tropics but nowhere more commonly than in west and central Africa. Here it has gone on for a long time. It is a very wasteful way of making a living and is harmful to natural resources. It is definitely an exploitive economy. On the edges of the forest, in the savannah, it has had serious effects, for burning the forest and exhausting the soil have led to increased aridity. It is letting in the desert over the savannah.

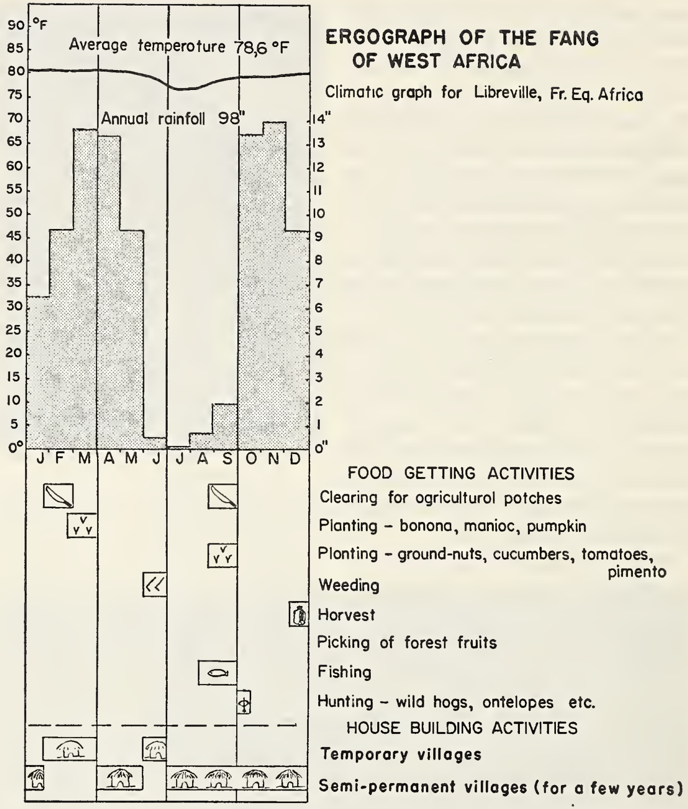

Fig. 5·10. Ergograph of the Fang of West Africa.

Other aspects of life are not dissimilar to those of the other primitive groups. Communal or kin-group ownership of land, small closely knit villages, a small population, a limited division of labour, dependence on local forest resources for the materials from which to build houses and make tools and clothes, a simple diet, a constant struggle against disease —these are all characteristic.

ORIENTAL CULTURAL LANDSCAPES

Rice Culture. In monsoon Asia, agriculture early became quite specialized and by comparison with primitive practices, quite advanced.

Over thousands of years, it has become closely adapted to the land and the climate. It depends on a very careful, intensive, hand-developed treatment of crops and the soil. It uses every available space and husbands every resource. It is the opposite of exploitive, for across the centuries, it has improved the land. It affords a livelihood from a relatively small lot or farm, especially since the climate enables two or three crops to be raised in one year, and consequently it supports a dense population. In many parts, the farmers crowd into villages in order to save space for actual farm land as well as to find safety and protection. Each family has its own home, and there are many specialized buildings such as law courts, temples, shops, and offices. The villages are connected with a local market town by narrow, winding roads or canals. The fields make an intricate checkerboard of green, divided by low banks and irrigation ditches. Nearly all the forest has been cleared though a few mulberry or fruit trees may shade the homestead. All the land that can be transformed by man, for his own use, is brought under control. The whole landscape reflects his organization and activity. (See Fig. 5·11.)

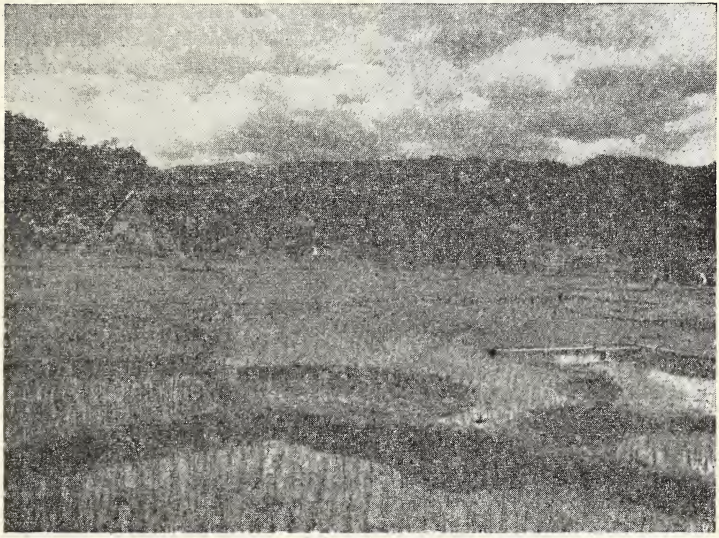

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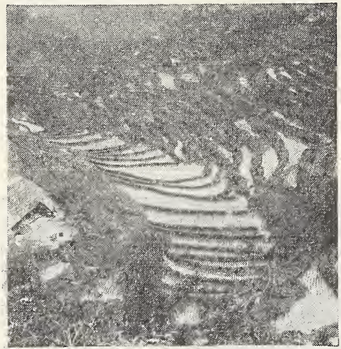
Fig 5·11. The cultivation of rice has transformed tropical lowlands in humid areas. Forests have been cleared back to the hills, and all the land that can possibly be sown is under cultivation. No space is wasted. Paths between fields are narrow banks. Houses are kept to the edge of the plain. Water is raised from the river and carefully distributed over the paddy fields.

The crop most suited to these intensive practices and to the monsoon environment is rice. This was native to the area and grew in the flood plains of the rivers. At each monsoon, the rivers would rise and flood the rice. Then followed very hot and very wet days that forced a rapid growth and produced a good yield of seed. The Indians, Cambodians, Siamese, and Chinese, who first appear to have cultivated the grain, soon proved its value. Its cultivation was carried to Java and to Japan and, eventually, to all the humid tropics. But although rice is grown in Africa and the Americas, it still grows best in its native habitat where over 90 per cent of the rice of the world is raised.

The crop is grown in flood plains or plains that can be artificially flooded. Flat land is essential, as the growing rice is commonly immersed in about six inches of water. Immense trouble is taken to flatten out the land and, if there is a pronounced slope, it is overcome by cutting or building out flat terraces along its sides. In this way, rice cultivation has been expanded back from the lowlands up into the hills. In southern China, the Philippines, and Japan, quite spectacular systems of terracing have been built up, the upper terraces drawing off the water from the mountain streams and then letting it flow down to fill up the lower ones. (See Fig. 5·12.)



Ewing Galloway

Fig. 5 · 12. Rice cultivation may eventually spread from the valley bottoms up to the hills, displacing the forest almost completely through the patient building up of a remarkable number of irrigated terraces. Note how the houses keep to the steepest slopes, unavailable to terracing. They are generally surrounded by trees, the remnants of rich hillside forests.

Just before, or at the commencement of the monsoon, the fields are ploughed up, usually by water buffaloes, which are accustomed to the wet, muddy conditions. Meantime the rice seed has been planted in special beds. When the seedlings are a few inches high, and once the monsoon rains have soaked the earth and swelled the rivers, they are transplanted in the fields. The water is fed to the fields by irrigation ditches and inundates the growing rice. Days of intense heat soon develop the crop.

After three to three and a half months, the rice is ready for harvesting. Usually by this time, the weather is clear and sunny. The rains have slackened or ceased. However, the water still lies in the rice "paddies" and so the workers go in barefooted and cut it. (See Fig. 5·13.) The rice is then hung on poles or platforms to dry. Once thoroughly dried, it is winnowed by hand flails. At length, the seed is separated from the chaff and is stored in large bins or granaries. It "keeps" quite well, even in the still warm climate.

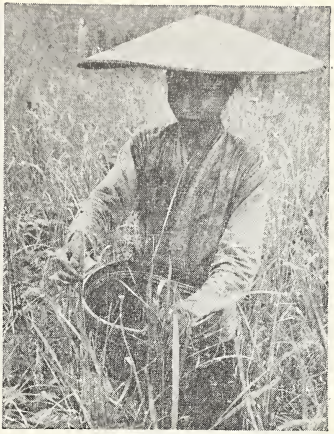


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Fig. 5 · 13. Rice cultivation in the Orient requires a lot of hand labour. Harvesting is done by hand; only the grain heads are cut off by a small knife held in the palm.

This kind of agriculture requires a great deal of human labour—in the transplanting, cutting, and flailing; it needs constant individual attention, by way of fertilization, weeding, and irrigating; it succeeds only through good organization and co-operation—the division of the flood waters through the paddies and the maintenance of the irrigation ditches necessitate goodwill and a sense of mutual responsibility; it entails careful adjustment to the landscape and to the rhythm of the climate; it is based on peasant operation of small parcels of land, but with its relatively high yields, it makes possible a dense population.

In addition to rice, other crops such as corn and beans, vegetables, fruit crops, and tea are raised. Frequently these are produced in the drier season of the year, thus making a double cropping system possible and ensuring the use of all the land for all the year. Sometimes they are raised concurrently with rice on land that cannot be flattened and flooded or on specially mounded banks running down through the rice fields. Except for tea, whose culture has now been westernized, these crops, too, are cultivated by the patient application of hand labour and by intensive practices of planting, fertilizing, and weeding: that is to say, by those habits we have come to associate with oriental agriculture.

The domestication of animals for meat, milk, butter, and cheese is rare in the Orient. Animals are kept for work purposes, to plough, to draw in the harvest wains, to grind the grain into flour under cumbersome rollers, and transport to and from market. Farm land is at too great a premium for use as livestock pasturage in order to provide man with meat. The food is raised directly for human consumption. Vegetable oils are used instead of butter. Meat is scarce. Pigs and chickens are kept by the family for family use but are not produced extensively. Many farmers keep fish in paddies, irrigation ditches, or in special fish ponds, and this is often the main type of flesh eaten for food. Therefore, there are no large barns on the farms and no large stock yards or packing houses in the towns. These things are noticeably absent from the cultural landscape.

The people do not derive only food from their crops. They chop up the stalk and mix it with clay to make sun-baked bricks with which to build their houses. These usually have steeply pitched roofs with wide eaves, to shed the monsoon rain, and are often thatched. Tile roofs, from hardened mud glazed to resist the rain, are also common, at least on the alluvial plains where there is plenty of mud. The houses usually have small windows to help keep them cool.

The straw and other chopped-up plant remains may be mixed with buffalo dung to use as fuel in the kitchen and on the hearth. Straw matting and plaited basketware are also common. These habits conserve wood, which is becoming increasingly scarce, even though the area was once covered by monsoon forest. However, groves of bamboo around houses and villages are fairly common, and the bamboo is used for kitchen-ware, furniture, building, and in every way possible. Implements and equipment are simple, in keeping with the use of hand labour, but they are usually made by village or city craftsmen.

Clothing varies with local conditions. In the very warm and constantly humid parts of the monsoon region, it is at a minimum commensurate with civilized people. Men generally, and women occasionally, work half clad in the fields. In village and town, men don a shirt or a cotton jacket over their trousers and women put on a silk blouse over a cotton skirt or wear a silk **sarong.** (See Fig. 5·14.) Women's clothing is often highly colourful to match the reds and yellows of the flowering trees. They are fond of personal adornment and have a pride in their appearance. Oiled parasols that keep

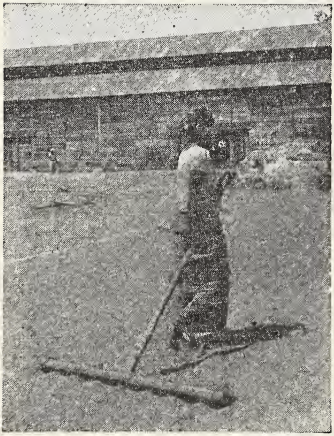

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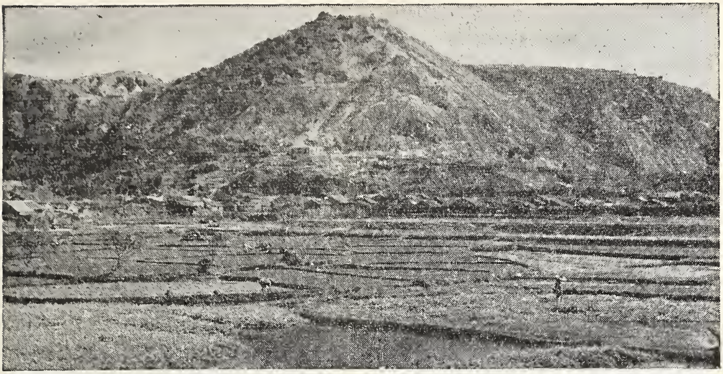
Fig. 5·14. When the monsoon rains are over, rice is brought to the mills for cleaning, husking, and grinding. Again, much hand labour is required to clean the rice. Here an Indian girl goes up and down raking the rice grains in the hot sunlight. Notice her flowered-white blouse hanging out over her cotton skirt, typical wear in the tropics.



Ewing Galloway

Fig. 5·15. A large, compact village in monsoon China, beside a fertile plain divided into small rice paddies. The farmers live in the village together but come out to work their fields individually. Neither farm houses nor woodlots are scattered among the fields. The road, instead of using up valuable lowland, is cut into the edge of the hill.

out the intense heat of the summer sun and also shed the sudden showers are carried by everyone. Conical hats with wide brims help to shade the face or throw off the rain and are worn even at work in the fields.

It is customary for communities to live in small towns or villages. (See Fig. 5·15.) From these, the farm folk go out to their fields every morning and return in the evening. The men generally do the ploughing and the sickling; the women, the transplanting and the winnowing; both are out weeding, hoeing, and applying fertilizer as the crop grows. The older women look after the homes. Children go to school until puberty, when they start to work. Shortly after this, girls are married, usually to husbands chosen by the family.

Family loyalties are very strong: frequently stronger than those of state or class. The family owns its own home and has the ambition to own its own land. The family is the chief labour group and engages not only in food-getting but in the making of clothes and simple instruments. A village often consists of a group of related families.

Considerable, though not complex, divisions of property and labour; the emergence of occupational and social classes; the organization of well-developed local government; a greater freedom of choice and action for the individual with, nevertheless, a strong sense of co-operation; a deep attachment to the soil; a religion with much tradition that stresses the importance of the family and its ancestors; a love of the simple arts —these things have all blossomed from the oriental way of life. They have helped to give it strength and resilience and to allow it to grow until it now embraces about half of the human race.

The limitations are, however, that it is not fluid in a world of rapid change; it depends much on human labour and does not give the individual time or opportunity to devote himself to pursuits outside of getting his living; it is highly sedentary and localized, and is, basically, a subsistence economy, raising just sufficient for local needs; and it has pushed to the limit its dependence on agriculture. The population is now increasing in excess of food production and so, until trade and industry provide alternative employment, there are too many people dependent on the land. The problem of very dense settlement—a density of over 500 people per square mile is not unusual—and of a still increasing population, is one of the gravest faced by the monsoon lands.

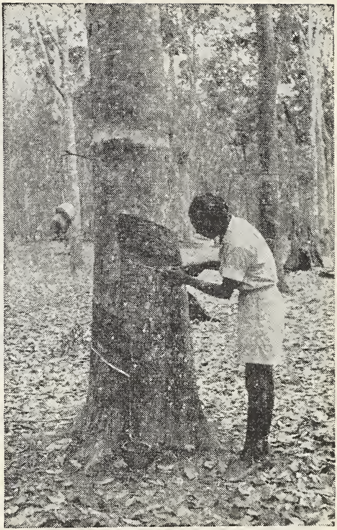


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Fig. 5·16. A rubber plantation in Malaya. Instead of going through the forest looking for scattered trees, the natives work in plantations where the whole area suited to the crop is planted in rows of trees. The maximum use of the worker's time and energy assures a regulated supply of latex.

OCCIDENTAL CULTURAL LANDSCAPES

Plantation Agriculture. Western ways of living have made a tremendous impact upon the humid tropics. The western nations have found they need many tropical products like palm oil, coffee, cocoa, tea, rubber, and jute. Consequently, they have persuaded the native peoples of these lands to modify their ways by adopting occidental methods of raising crops and by gearing their efforts to world trade and a cash economy. (See Fig. 5·16.)

The principle of production is the plantation system where one crop is raised in many plantations over wide areas wherever optimum climatic and soil conditions prevail. Thus a systematic method replaces the erratic, desultory way primitive peoples have of collecting fruits, rubber, and palm fibres. Also a commercialized, extensive method replaces the intensive, subsistence practices of the oriental farmer.

Something new is added to the tropical landscape: the plantation camp instead of the village (See Fig. 5·17.); organization of life and work by the company instead of the tribe or the family; mechanization, whereever feasible, instead of hand labour, with machines replacing mere tools; the orderly arrangement of selected trees instead of the confusion of the forest; and their arrangement over a wide area instead of on the 2-3 acre farms so typical of oriental agriculture.

Such are the changes in the sugar plantations of the West and East Indies; in the coffee plantations of Brazil and Java; in the palm oil plantations of West Africa; in the jute plantations of India and Pakistan; in the rubber plantations of Amazonia, Liberia, Ceylon, Malaya, and Indonesia; and in the tea plantations of India, Ceylon, and Java.

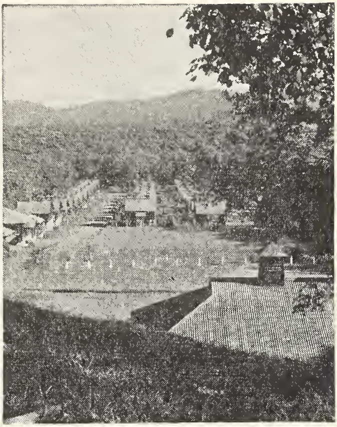

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Fig. 5·17. The impact of the plantation system is best seen in the plantation settlement. Compare the orderly village, flat roads, small gardens, and village playing-fields with the irregular arrangement of the primitive village (Fig. 5·2) where the houses follow the irregular "lay of the land". Nigel Gardiner estate, Malaya.

These changes are considerable, not only in the geography but in the social life of people. On the plantations, tribal and family loyalties clash and then give way to those of the economic group; team work carries on the communal or family tradition, but there is much more opportunity for the individual; different races and religions mix; the old order gives way to the new. All this represents a real problem, and its solution is crucial to better adjustment between western and other cultures.

QUESTIONS

A

1. What countries lie entirely in the hot humid regions as shown in Fig. 5·1?
2. Examine Figs. 5·2-5·9 closely: give for each the reasons why the scenes they represent are typical of hot wet lands.
3. Looking at the scene in Fig. 5·2, why could it be said to be part of the hot humid zone of the world?
4. Examine the school building in Fig. 5·3. What is there about its shape and the materials of which it is made that would seem to render it a good adaptation to a hot wet climate?

B

5. Describe the life of primitive peoples in hot wet lands in terms of their settlements, houses, clothing, tools, and ways of getting food.
6. What are the main food-gathering activities of the Fang of West Africa? Do they have any marked relationship to equinoctial rains or to less humid periods of the year?
7. What aspects of rice culture are shown in Figs. 5·7, 5·11, 5·13, 5·14?
8. What types of relief are shown in Fig. 5·15? With what aspect of relief is the village associated? With what, the farmers' fields? Where are the wood lots? Why are there no fences in the fields? Are there any signs of cattle or cattle byres (barns or stables)? How are the fields being worked?
9. In what ways does the plantation settlement shown in Fig. 5·17 differ from other settlements pictured in this chapter?

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CHAPTER VI

Man in Temperate Humid Lands

General Reactions. Life in temperate lands shows a pronounced seasonal rhythm, different from the tropics. This is reflected in virtually everything, as has been noted. Food varies from heat-conserving types in the winter to heat-alleviating types in the summer. The seasonal change in clothing is drastic both in material and style—from the lightest of aerating coverings to the heaviest of woollens and furs. Houses must be built for the two seasons, to be cool and airy in summer and cosy and warm in winter. Work and play often vary with the season, too, as do social life and religious observances. In olden days, religions expressed the lessons to be learned from winter and returning spring by mysteries and myths of death and immortality that still find their echoes in the religious calendar.

Within the larger changes, smaller ones, due to the passage of warm and cold fronts in temperate cyclones, are also important. They too affect clothing, food, transportation, and work. Within a few hours, a person may be forced to go from light to heavy clothing, or change from an open to a closed vehicle, or put off a golf match to play on the curling rink. These variations, though often exasperating, are, nevertheless, stimulating and maintain the constant adaptiveness and initiative for which, on the whole, temperate peoples are noted. (See Fig. 6·1.)

HUNTING AND FISHING

Primitive people are fewer in the temperate humid lands than in the tropical regions. This is mainly because these are very desirable lands and have been competed for by many progressive peoples, who have either converted the primitives to their way of life or have driven them out to colder or drier regions. However, in areas isolated by distance or by local conditions, like swamps and bad-lands, or in special native 'reserves', old ways are retained.

Native fishermen on the islands of the Canadian Pacific region and native hunters and trappers of the Canadian and Siberian boreal forest

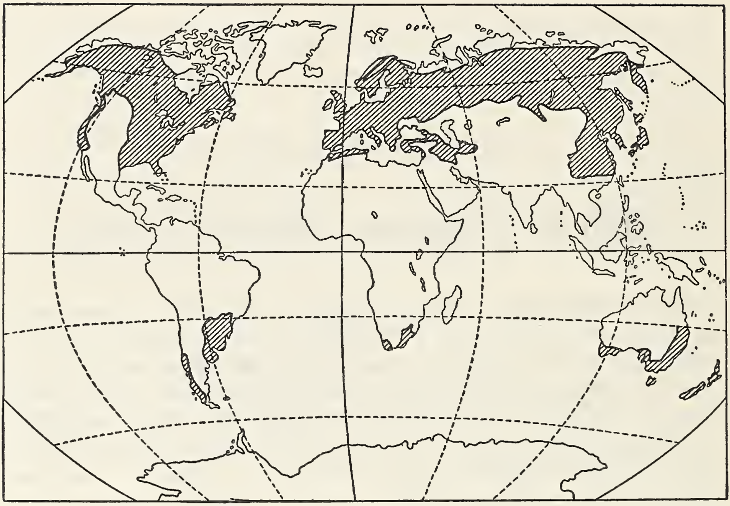


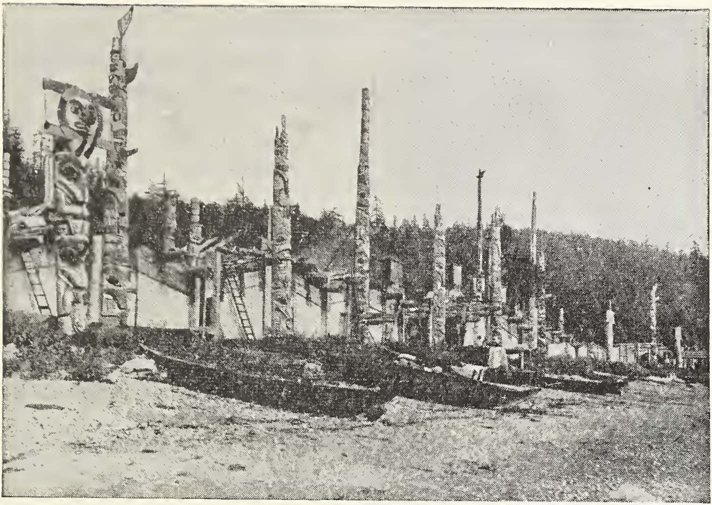
Fig. 6·1. The temperate, humid regions of the world.

areas are about the only family groups left to carry on the old modes of living. Even in these groups, however, a certain amount of change to modernization is apparent. As with all groups who existed in a semi-primitive state, their food, clothes, homes, and activities corresponded closely with their local environment, as a glimpse at their recent past will clearly show.

Thus the **coast Indians** were mainly fish eaters; they dressed in bark-fibre aprons, from cedar bark, or in skins from the animals of the coastal forests; out of the giant conifers of the coast they built large-family homes, sometimes sheltering 40 to 50 relatives; they used tools made of wood and bone, and their activities were geared to the annual salmon runs and the movement of other fish and game. (See Fig. 6·2.)

The **buffalo hunters** of the prairies used to get most of their food from the buffalo; they made their hunting shirts and leggings and their tipis, or tents, from its skins; and spent their time in following the migrations of the herds. These they would kill in great numbers by co-operative hunts when they drove them, thundering, over cliffs to be killed below.

The **caribou and deer hunters** of the boreal and eastern forests lived chiefly on meat, with some fish and wild berries; they made their houses from bark, lining them with skins; their canoes were of birch bark; their clothes were fashioned out of dressed deer or elk skins, ornamented with



National Museum of Canada

Fig. 6·2. West Coast Indian village as of old with large wooden houses, totem poles, etc. at the foot of the forest. Skidigate, B.C., in 1878.

porcupine quills; their activities varied according to the animals they hunted in different habitats and at different seasons.

Similarly the **reindeer hunters** of Siberia lived simple lives pursuing game, making clothes from skins, using wood from the forest for the framework of tents and sleds. Lengthy migrations carried them to the Arctic tundra in the short summer. Most of them lived up and down the great rivers and fished, snared birds, and ate edible plants and berries to round out their diet. (See Fig. 6·3, page 88.)

However, these old ways have been much modified. In North America, the cash economy has invaded the lives of even the most primitive and has supplied them with up-to-date tools and household utensils, woollen and cotton clothing, and frame houses—built in the prevailing style. At the same time, it has provided them with a more sedentary and safer livelihood in exchange for their catch of fish and furs. Thus the Coast Indians of today have given up their large kin-houses for individual family homes; they go out to fish in launches powered with gasoline or diesel motors; they use ready-made nets of hemp or twine, and manufactured hooks; they sell their fish to canneries, and with the money buy canned and packaged foods of various kinds, clothes and other goods made in the big factories of Vancouver, Toronto, or Montreal.

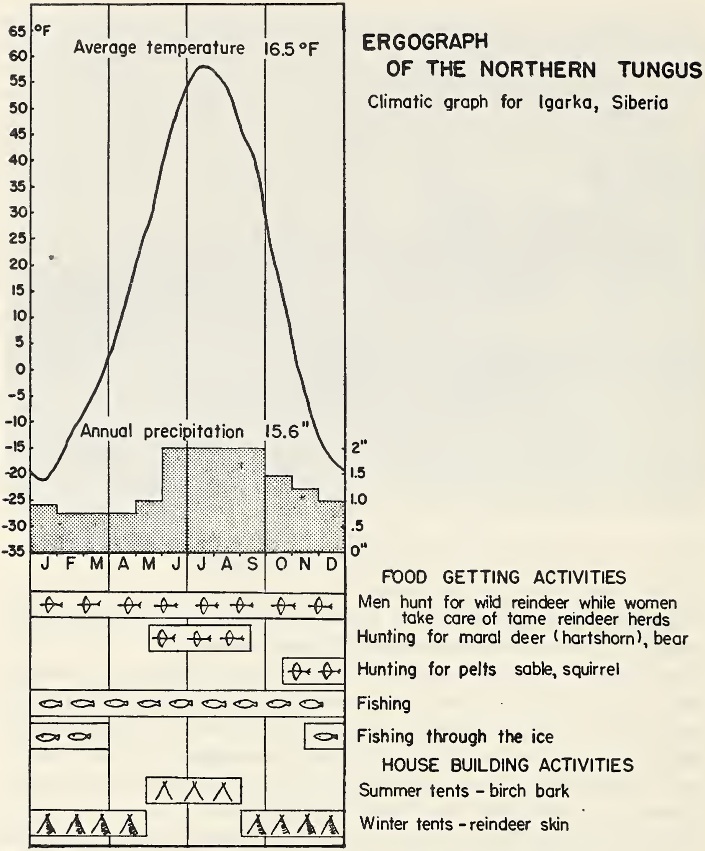


Fig. 6·3. Ergograph of the northern tungus.

In the same way, the hunter in the northern and eastern forests has turned into a commercial trapper, (See Fig. 6·4.) with a regular series of trap lines, steel traps which he buys at the store, jack boots, hunting shirt, and parka obtained from the trader; he eats imported foods and lives in a log or frame house made by imported tools.

AGRICULTURE

The temperate humid zone as a whole has turned to agriculture, trade, and industry for its development. With the vast populations of Europe, north-east Asia, and north-east North America to feed and clothe from the land, there is little room for primitive occupations. Again there are rather different cultural landscapes in the oriental as compared with the occidental parts of the region.

National Film Board

Fig. 6·4. An Indian trapper at his trap line in winter bush.

Oriental Agriculture. This is found in north China, Manchuria, most of Korea and northern Japan, and is not unlike its tropical counterpart. It is dependent largely on an immense, careful, personal application of labour; the intense use of the land, with no waste of available space; heavy fertilization; concentration on crops, with little animal husbandry; and a relatively small farm unit in a crowded plain.

The crops consist of northern rice, (where seasons are long enough), and kaoliang and millet in the summer; with winter wheat and pulses, planted in the fall and ripened in the following year. There are thus quite a number of crops grown, and they are rotated in order to help retain the fertility of the land. By growing two crops, like kaoliang and soy beans, in alternate rows, the soil is kept as fertile as by rotating these crops one year after the other. This is known as **interculture.** Often cotton, tobacco, mulberries (for raising silk worms), or soy beans form subsidiary crops, for cash purposes. However, most farming is on a subsistence level. Large-scale cotton or tobacco farms are rare. Soy bean production is about the only highly commercialized form of oriental agriculture in temperate lands.

Again, after ploughing, the farmer does a good deal of hand work in hoeing and weeding, scything and threshing. Because of the scarcity of machinery or the poverty of the average Chinese farmer, the cereals obtained may then be ground by a mule-driven roller. Horses, mules, and donkeys are the common work animals, with oxen used here and there. Pigs and chickens are kept for their meat, but there are very few beef or dairy farms. Animals are important mainly for transportation and for the manure they provide. Fertilization is one of the main problems since the land is used so intensively, and has been in use so long. In addition to animal manure, human waste or "night soil" is used. Carts collect this from the houses each day and take it to manure pits. Later it is spread on the fields. Ashes, silt from floods, the waste from plants, and special fertilizer cake from crushed beans or cotton seed are also used. In spite of all this, yields per acre are generally lower than in the western countries, where the land has not been exhausted to the same extent.

The people build substantial houses made of chopped-up straw and mud formed into bricks; windows may be absent on the outside of the house as they would allow winter cold to enter; those on the inner court are narrow; fireplaces or braziers are necessary. In the summer, men work naked to the waist and women are lightly clad, but in the chilly winter both wear padded clothing with long trousers tucked in at the bottom, and have fur caps with flaps over the ears. (See Fig. 6·5.)

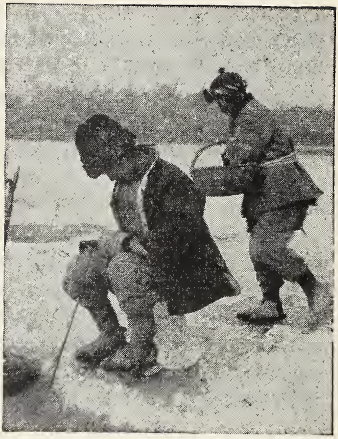
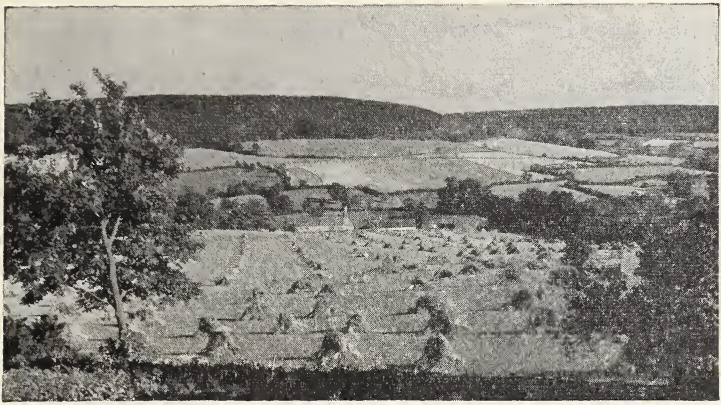

Ewing Galloway

Fig. 6·5. Winter wear in northern China. These boys, fishing through the ice, wear quilted clothing, fur caps with ear flaps, puttees around their ankles, and thick-soled shoes.

Enough money is earned from the crops to buy household and farm utensils, and thus local trade and industry are developed. Most of this, however, is on a local or regional basis. In North China and Korea, there are few large factories or distributing companies, although these are rising, as occidental practices become adopted. They are much more common in the large cities of Manchuria and Japan.

Rural life is predominantly at the stage of domestic industries and local trade and production. It depends essentially on a truly tremendous, but never quite sufficient, output of human labour. Production per capita is much lower in oriental than in occidental agriculture. That is why a relatively unpopulated country like Canada can produce such very large surpluses for export. Canada's wheat production is enormous for the number of farmers concerned. The wheat production in China is small in proportion to the numbers engaged in raising the crop. This is one reason why China and Japan cannot produce enough for their own requirements but must import much food. This lack of productive power is also a reason for the very low standard of living of the oriental peasant. "The meagre farm income," Cressey points out, "is largely devoted to the necessities for bare existence, with little margin for health, education, recreation, or community development. This condition is closely associated with the small size of the farms and in turn is related to the high density of the farming population."

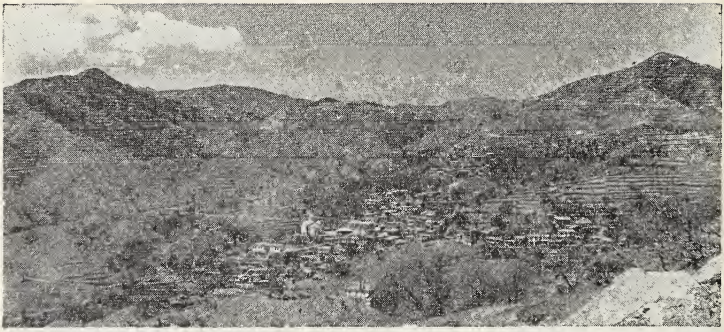


Ewing Galloway

Fig. 6·6. Typical occidental rural landscape in the temperate zone: large farms set individually among their own fields; a rotation of crop and pasture land; and the retention of much woodland. Contrast this picture with the oriental landscape in Fig. 5·15.

Occidental Agriculture. Occidental practices are far more widespread in temperate than in tropical lands. They produce a quite different landscape from that of the East. (See Fig. 6·6.) There are usually more woods left in the scene and much more pasture: there is not so much cropland. The homesteads are scattered on their own farms; there is not so much village life. Each steading is rather large, with many buildings for the animals. The area of each farm is larger and the fields more extensive. Fences are necessary to keep in live stock. Many more animals are to be seen, and they are used, not mainly for draught purposes, as in the East, but for milk or meat. More motor-driven machinery is used.

Europe is transitional between East Asia and the temperate lands of the New World. In Europe, farms are of only a moderate size; many farmers live in villages and go to work in their fields during the day; and a few farms are still not very mechanized but rely on old methods and hand labour. Co-operative labour is common, especially at harvest time. (See Fig. 6·7, page 92.) In western Europe, where population pressure is quite considerable, the farms crowd together and are of medium size. In landscapes that have not changed much from mediaeval times, they are centred around villages, have few fences, if any, between them, and go back to common lands where the cattle and sheep are herded. However, the break up of common lands and the consolidation of fields



British Information Service

Fig. 6·7. Rural scenes in eastern Europe, like this one in Cyprus, resemble those of the Orient in their closely packed villages, their small strip fields devoted chiefly to crops or orchards, and in the obvious patience and immense labour that has gone into terracing the hillsides. Agricultural land has almost entirely replaced woodland; the remaining trees (olive) are useful to man.

has progressed to the extent that most farms have cropland, pasture, and coppice of their own. The farmer and his family live in a nice home, fronted by a lawn, with a kitchen garden on the side, and a yard at the back. Around the yard are barns and byres and tool sheds.

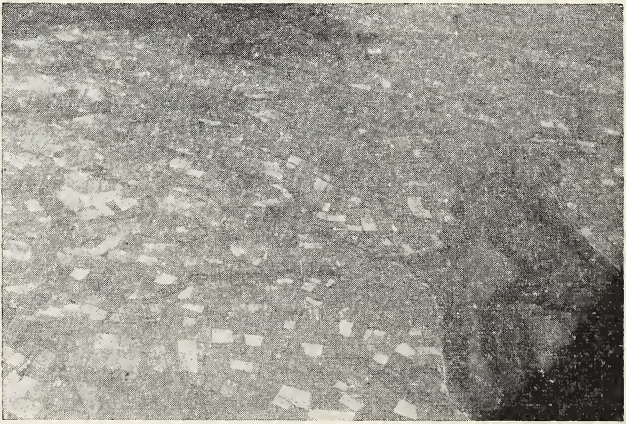


Fig. 6·8a. The band-box appearance of the English scene is well illustrated by this view of the Severn plain, where the land is divided into innumerable small irregular fields, with hedge-lined, winding roads between them. Farm houses are widely scattered, nestling among their own fields. Villages are fairly numerous and usually are of the nucleated-settlement type.

Labourers often continue to live in the village and cycle out every day, but on some farms they live in the hired-man's house.

In looking at the landscape of England or Normandy, homelands of the Canadian people, one is struck as Crankshaw remarks, "by the band-box quality of the countryside, with its tiny fields divided by green hedgerows, its swift succession of contrasting scenes, chalk down and water meadow, fat cornfields and hazel coppices, rich grasslands and sandy commons, more intersected fields, more grassland." The appearance is that of a charming miniature, painted in the freshest of colours. (See Fig. 6·8a.) Canada, on the other hand, shows a bolder and larger sweep, with wide areas of wood and rock, broad belts of farmland, (See Fig. 6·8b.) fewer cosy villages, country towns that are like fragments of the city put down in the fields, long straight roads, and a far scattering of homesteads with their huge barns glistening under continental skies. Things are obviously on a larger scale, even to the wastefulness that to a European seems so evident but which is scarcely noticed by a Canadian, familiar as he is with immense horizons and plentiful resources. (A certain margin of waste seems to be accepted in the large-scale method of production and in the use of machinery rather than hand labour. Nevertheless, so far as production per capita is concerned, few countries match the efficiency which gives a very high yield for the amount of work expended.)

In Canada and the other new lands of the Commonwealth and in the United States of America, western methods have reached their peak of

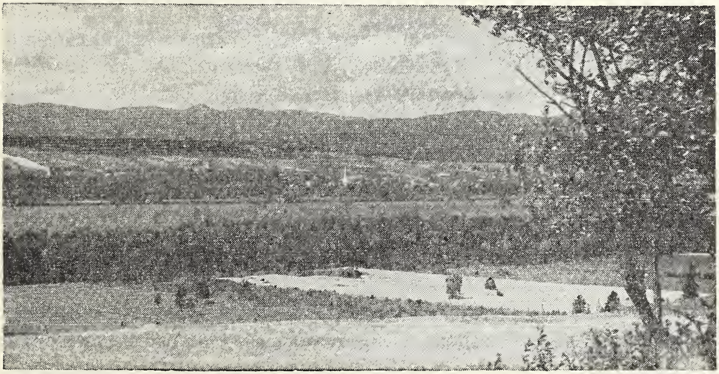


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Fig. 6·8b. The Canadian scene is characterized by a considerable amount of the natural landscape: woods, rough pasture, or range; as well as by broad fields and loose, sprawling, or elongated villages.

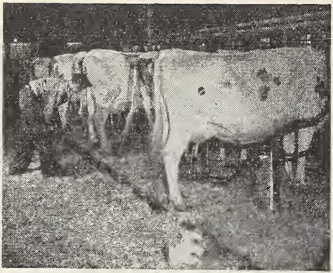

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Fig. 6·9. Canadian farming is, typically, mechanized farming. Here a boy is about to adjust a milking machine in a New Brunswick dairy farm.

development. Here the farm unit is all important, villages being insignificant or existing mainly as transportation and trading centres, not as residential places where the farm population lives. The farms are of moderate to large size, depending on their product. A mixed farm may be 100 to 150 acres; a wheat farm, 640 acres; a sheep ranch, many times that again. Most farms are heavily capitalized and mechanized. (See Fig. 6·9.) They use the minimum amount of human labour. Indeed, labour is one of the dearest commodities, whereas in oriental farming it is one of the cheapest. Transient labour is relied on at harvest.

The farmer is a specialist engaging strictly in a commercial enterprise. Thus highly specialized types of farming emerge, and the landscape changes considerably from tobacco or cotton farming to dairy, cattle, or sheep farming. Each type of farming uses the soil, climate, and topography for which it is best suited. So specialized are many farms that they do not raise their own flour, milk, butter, and eggs. Thus a wheat farmer might buy all his vegetables, meat, and milk in a store, like a miner, lumberjack, or city clerk.

To do this, he must have ready access to city stores on good roads by his own automobile. He demands the services of carpenters and mechanics, insurance agents, soil specialists, and veterinarians, and so forth. Many occupations are needed to keep the farmer going. He must deal on the market through the banker or broker. In fact in most of his living, he is like a city man using city services. Rural life is urbanized in many of its aspects and, through the city, is linked with world markets in a world-embracing trade economy. The local market may be relatively insignificant, and life may be tuned to what is happening on the exchange in Montreal, London, and New York.

Specialization has developed well marked agricultural regions or zones. These are of two kinds. There are the zones produced by distance to or from an urban market and there are those that reflect climatic or soil zones. Of the former, four distinct zones may usually be found: an outer one consisting of cattle or sheep rearing on large farms mainly under hay and pasture; a general farming zone, with some live stock and a few cash crops grown in rotation; a zone of dairy farms of moderate

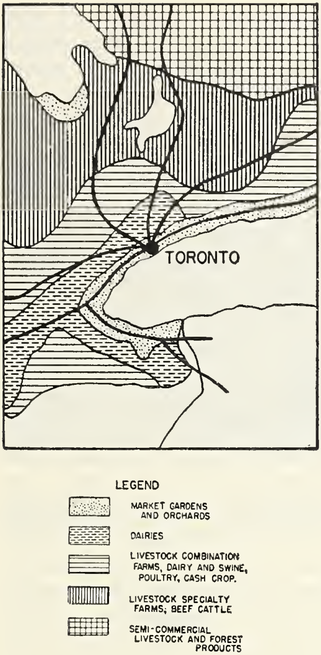
TORONTO
LEGEND
MARKET GARDENS AND ORCHARDS
DAIRIES
LIVESTOCK COMBINATION FARMS, DAIRY AND SWINE, POULTRY, CASH CROP.
LIVESTOCK SPECIALTY FARMS; BEEF CATTLE
SEMI-COMMERCIAL LIVESTOCK AND FOREST PRODUCTS

Fig. 6·10. The effect of nodal position on types of farming. Around major cities the keen competition for land leads to a zonation of farming, with market gardens at the centre, dairy farming next, and livestock and semi-commercial farming on the outer margins. Around Toronto, fruit, vegetable, and dairy farms, which must be close to the city because their products are perishable, occupy the inner zones; less specialized types of farming, supplying a seasonal rather than a daily or weekly market, do not need such an intensive use of the land and are in the outer zones.

size, growing silage crops and pasturing milk cows in rich meadows of grass and clover; an innermost one of "truck" farms or market gardens, small in size but intensively developed to produce all kinds of vegetables, poultry, and eggs for the city market. (See Fig. 6·10.)

The agricultural regions that reflect climate or soil are also significant. Thus in Ontario, the rolling morainic land is usually associated with **general farming**. Here on farms of 150 acres or more, silage corn, oats, and timothy hay are raised with perhaps a field of winter wheat as a cash crop. Much of the land is too bouldery and steep for ploughing and is left in rough pasture, to be grazed by cattle or sheep. The cattle may be young steers imported from the semi-arid ranges of the interior to be fattened by feeding on the humid pastures and silage of the farm before being sold in the stock markets, or they may be kept to breed young heifers sold to the dairy farms and young bullocks later to be fattened and marketed for butcher meat. The farms are large, with big combination barns and stables. Family labour is still used, although mechanization is considerable. Farmers use the facilities of local market towns, where their wives do their shopping, and to which their children are sent for education.

In the river valleys and those parts of the plains not used for special crops, **dairy farming** is usually carried on. (See Fig. 6·11, page 96.) Here the farms are about 100 acres in size; they rely on large yields of silage corn, small grains, clover, and sown grasses. The pasture is very lush and is usually rotated with cereal and root crops. Cattle are mainly pure

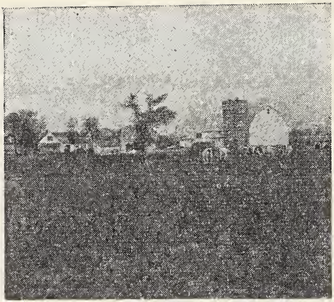

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Fig. 6·11. Dairy farms in Ontario display large barns and silos and rich cultivated pastures.

bred milk cows and are herded with great care. During the long winters they are housed in large, warm, well cleaned barns and are fed cattle cake as well as hay and silage. The farmer has a great deal of field and milking machinery (See Fig. 6·9.) and usually requires one or two hired men and their families to help with the constant round of chores. Standards of living are generally high. Milk is sold to the city, and the farmer and his family often have occasion to go into the city and patronize its businesses and stores.

On parts of the plain where special soils are suited to particular crops, there may develop **specialized crop agriculture**. For example, in the sandy soils of south-western Ontario is Canada's chief tobacco belt. Here farm after farm with their hot frames, seed beds, sprinklers, and curing barns, may be seen raising little more than the tobacco that is the mainstay of their prosperity. (See Fig. 6·12.) No silos, no large barns, no great combines or silage choppers or blowers are to be seen. The machinery and the outhouses are all geared to tobacco. The farms are often no

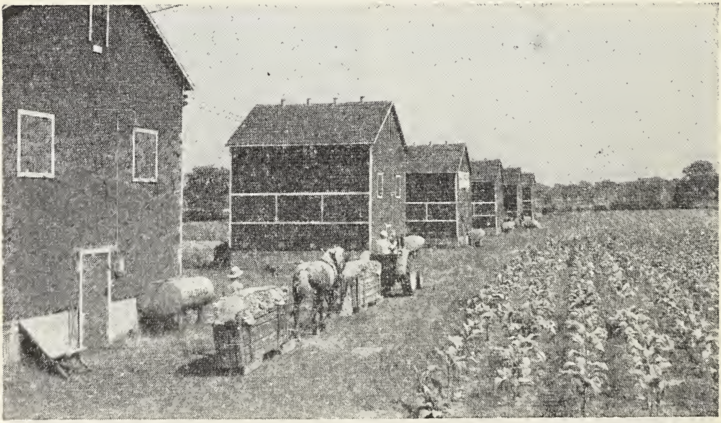

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Fig. 6·12. Tobacco farming in Ontario is based on intensive development of the land. Much seasonal labour is employed in picking and curing the tobacco.

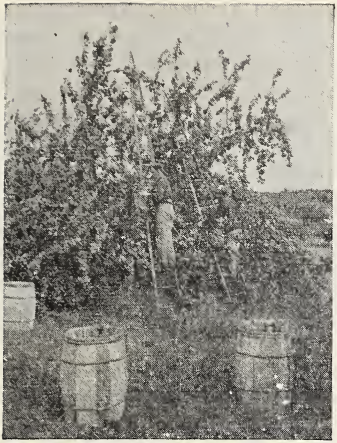

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Fig. 6·13. Fruit farming in Ontario adjusts itself carefully to climate, soil, and relief.

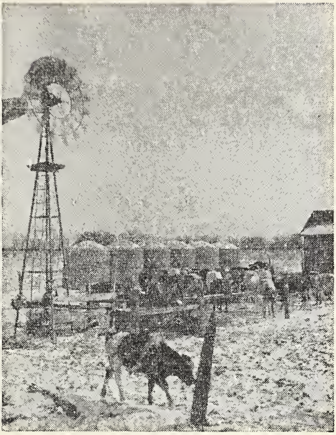

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Fig. 6·14. Close-up of a farm in south-western Ontario showing corn cribs full of corn. These are used to feed cattle and pigs during the winter.

more than 25 acres, but they support substantial homes where people live at a fairly high standard of comfort. During the picking season, camps are set up for transient labourers, who come in great droves from all parts of the Province for the few exciting days of the tobacco harvest when work is at an intense pitch and good wages can be earned.

Across parts of the plain stretch low ridges of gravel or sand. These were formerly the beaches of ancient glacial lakes. The lakes have emptied but have left behind a heritage of warm, fertile, easily-worked, well-drained soils that are ideal for fruit farming. This specialized type of farming is also found in climatically sheltered areas such as the Niagara Peninsula, away from killing temperatures in winter and from the danger of spring frosts. (See Fig. 6·13.)

The fruit farmer has a small farm—of 5 to 25 acres—but works it so intensively and has such a high-priced product that he, too, can afford a good home, a car, and many of the amenities of city life. Again, during the picking season, cabins on the farm or camps of tents in the vicinity house multitudes of casual labourers. Once harvest is over, work diminishes and many farmers spend their winters in the south.

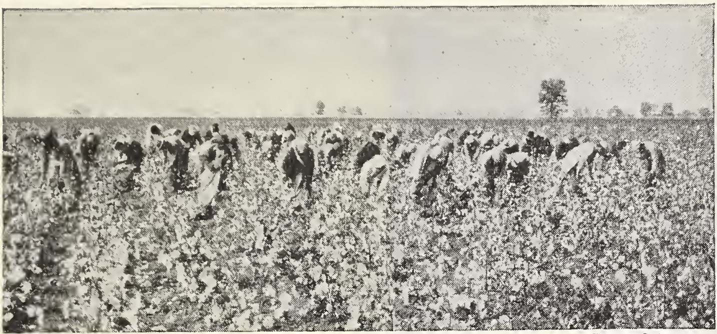
In the extreme south-west of Ontario, on the flat, fertile clay plains of the Windsor area, special crops such as sugar beet and sweet corn are raised. (See Fig. 6·14.) In summer, parts of the landscape resemble the corn belt farther south in Indiana and Iowa. Fields of tall corn, grown either for human consumption or for animal feed, surround the large brick farm houses. In the farm yards are huge corn cribs where, after the harvest is over, the corn cobs are stored. The corn stalks may be chopped up for silage or left in the field. In the latter case, cattle or pigs are turned in among the stalks to feed on them until winter whitens the whole land and the live stock is brought in. There, in great barns, it is fattened on the corn silage and cake, in due time to become prime beef or pork products.

Occidental agriculture thus sees the widest specialization and the concentration of effort on the same product over optimum areas—a practice which is rather different from that of the Orient, especially in the temperate humid lands.

Another distinguishing characteristic of occidental agriculture is the considerable use of **live stock.** The East prefers to grow crops for immediate human consumption rather than feed them to cattle which are in turn to be fed to the people. Possibly this is due to the immense pressure of the population. It may be due to different tastes. The West was long a hunting and then a herding community before it turned to agriculture. Wild cattle ran in the woods of humid temperate Europe. Eventually when they were tamed, together with pigs, sheep, and poultry, they entered into the traditional life of the West. Thus a meat-eating tradition grew up that has continued ever since. It is said that meat gives energy and warmth and so has, no doubt, helped people to endure the long winters of the temperate climate. This may have continued to make it popular enough to be used even after the pressure of population might have preferred cropland to pasture. There can be no doubt of the high dietary value of milk, butter, and cheese; and cattle are now being introduced into the East in increasing numbers to supply the demand for these products.

Live stock has the additional advantage of supplying leather for shoes and many other goods, and wool for clothing. The growing need for more and better clothing, in particular, has developed an immense textile industry based on sheep farming.

Occidental practice stresses the development of **industrial agriculture.** The raising of sheep for the woollen industry was matched by the raising of flax for the linen industry and cotton for the cotton industry. Whereas many oriental farms grow some cotton, few specialize in nothing else but cotton. Instead, they raise enough to card and spin cotton thread on the farm or in the village. Only where they have been westernized, as in India and Pakistan, do they specialize in cotton for the world market. In marked contrast are the farms of the West where, should conditions



Ewing Galloway

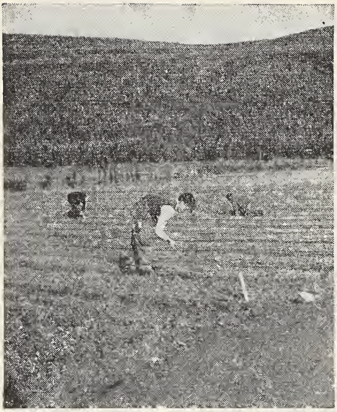
Fig. 6·15. A large cotton farm on the Carolina plains, with nothing but cotton in sight. The modern tendency to mix other crops with cotton, spreading through the South, is not in evidence here. Commercial farming in North America tends to concentrate on one or two chief cash crops.

be suitable, thousands engage in cotton farming and do so almost exclusively, as is the case in the American cotton belt. On larger farms, very little farm produce is raised; the whole energy of the family is devoted to growing the industrial crop that is then sold in exchange for clothes, food, and the money for recreation, education, and other things. (See Fig. 6·15.)

OTHER OCCUPATIONS

Commercialization and specialization, linked up eventually to industrialization, have led to the use of *all* the resources of the land in the occidental landscape, and lumbering, mining, fuel extraction, power development, and transportation are all more fully used than in an oriental region. Much of the wealth of the Occident has come from its forests, water power, oil and gas wells and mines, rather than out of the soil as is the case in the East. This is true to such an extent that where the land might be left to farming because of the good soil on the top of it, as in eastern England, it may, nevertheless, be developed by mining, the huge steam shovels removing the soil to get down to the rich beds of coal or of iron beneath. Thus strip-mining often competes with agriculture and throws up its heaps of black and red waste amongst the green fields.

In parts of Europe, scientific forestry also competes with agriculture, especially where farming is marginal. Here, as on the moors of England and Scotland, trees are planted and the tending of cattle and sheep is replaced, eventually, by lumbering. Similarly in many parts of Canada, especially in British Columbia, central-eastern Quebec, and in north-



British Information Service

Fig. 6·16. The illustration points up man's effort in changing the geographic appearance of the country side. Here, what was formerly a Scottish moor is being reforested to coniferous trees. The seedlings were cultivated to planting size in the reforestation nursery in the valley below the moor proper.

ern Ontario, when the virgin forest is cut, it is allowed to come back again in forest and is not invaded to any great extent by agriculture. (See Fig. 6·16.) Much of the forest land area is regarded as the permanent haunt of the lumber jack where the lumber camp, with its sawmill, bunk houses, dining hall and recreation centre, will remain the chief form of settlement, vying with village and town.

QUESTIONS

A

1. Name the countries included in the temperate humid lands in Fig. 6·1.
2. What are the main food-getting activities of the northern Tungus, as indicated in Fig. 6·3? What relationship do they bear to the climate?

B

3. Compare and contrast the activities of the Tungus and the Fang.
4. Why are there so few primitive peoples left in the temperate humid lands as compared with the hot wet lands?
5. There are slight, yet significant, differences between oriental temperate humid, and oriental hot wet landscapes and life. What are they?
6. How does the landscape in Fig. 6·6 differ from that in Fig. 5·15? To what extent is this difference due to differences in human culture?
7. In becoming highly specialized, occidental agriculture has tried to make the most of geographical resources. What kinds of agricultural regions have resulted?
8. List the similarities and differences between oriental and occidental agriculture.

9. State in terms of coast plains, river valleys, and well-known market towns the areas covered by the different farm regions shown in Fig. 6·10.

C

10. Has agriculture the importance in temperate humid lands that it has in tropical ones?

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CHAPTER VII

Man in Dry and Cold Lands

General Reactions. A glance at an atlas will show that the dry and the cold lands are but thinly settled or even uninhabited compared with the humid lands. Here are few great capitals, populous nations, fertile fields. Indeed were it not for the pressure of population in the more favoured climates, these areas (See Fig. 7·1.) might be left empty or be the haunt simply of primitive people seeking refuge in isolation. Griffith Taylor calls these lands the **zones of privation.** Fleure refers to them as **regions of wander** or **of difficulty**. Jonasson speaks of them as **death zones.** Such terms are contrasted with zones of stimulation, regions of increment, or life zones that describe the more productive areas already discussed.

In the dry and cold lands, plant and animal life are much restricted. Plants have very little leaf; they are short and stunted; they are often widely separated from each other and do not make an even, close carpet of vegetation. Consequently, they offer less food for animals, for the same area, than do humid lands. Animal life is frequently gregarious but though large herds of antelope, buffalo, or deer may be seen, they have to wander over a wide area in order to obtain sufficient food; consequently, density per square mile is low.

For these reasons, human population is also sparse. Farmers need a very large acreage to grow the same amount of grain that could be raised on half or even a quarter of the land in humid regions. It is customary to leave much of the farm land fallow each summer so that it may not be unduly exhausted. Where farming is not possible, people herd or hunt animals. In either case, they have to make room for, or follow, the annual migrations of their herds or of the objects of the chase. Such migrations mean that a large amount of land is needed to embrace the summer and winter pastures. A wide area is required to feed relatively few people.

Only where natural oases are found or irrigation can be practised may dense populations evolve. Otherwise a large space is needed to support

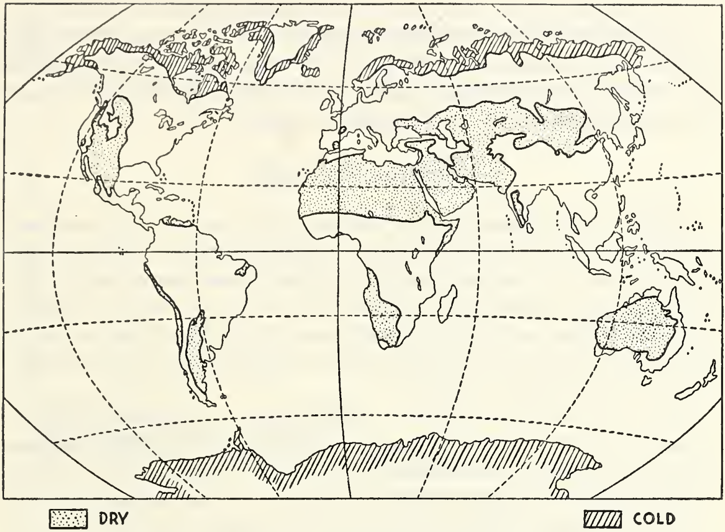
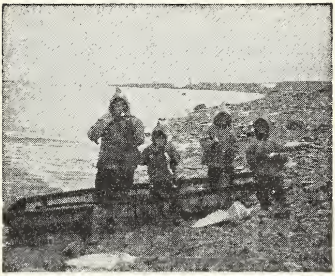


Fig. 7·1. The dry and cold regions of the world.

farmer, herdsman, or hunter. This in turn has helped to isolate people from each other and to make them rather self-sufficient. There is little continuous settlement. Frequently, wide zones of uninhabited land lie between the communities. Some groups have welcomed this and have found the dry or cold areas a place of refuge. Usually such groups are the more primitive people.



Department of Mines and Technical Surveys

Fig. 7·2. Eskimo clothing, while principally designed to keep out cold, is also meant to protect the individual from cold dry winds blowing over the empty Arctic deserts. The parka is particularly useful in this respect.

In both types of environment, winds are more than usually noticeable and many customs have developed to cut down the more serious or uncomfortable effects. In this respect, the hood of the Arab and the parka of the Eskimo are curiously related. (See Fig. 7·2.) Houses have few outer windows, if any, and doors are often protected by an outer screen or an inner flap. Farmers have to put up wind fences or plant rows of trees to act as windbreaks. Many of their practices are also aimed at reducing evaporation.

In these regions, day and night temperatures vary considerably and though it may be quite hot in the day, it is often chilly at night. Clothes are frequently adapted to this. The Arab's cloak, for example, helps to keep out the heat by day and the cold by night.

PRIMITIVE CULTURES

Collectors and Hunters in Dry Regions. In the heart of the American, Kalahari, and Australian deserts, live relatively primitive collectors, such as the Paiute, the Bushmen, and the Arunta. These people have a very hard life, which is spent chiefly in collecting wild seeds, digging for edible roots and grubs, and hunting small game. Their requirements are reduced to a minimum; they have few tools, occupational or social classes; little art, and a simple religion.

The American Indians living in dry conditions usually dwell in small villages of about a hundred people. (See Fig. 7·3.) These villages consist of huts of wood thatched with reeds and occur at large springs in sheltered sites. In the summer, most of the families abandon the village and wander out on their own, from spring to spring, collecting seeds, nuts, and roots, digging up grubs and insects, and trapping desert hares. A few tribes practise a primitive kind of irrigation, damming up streams that flow down from snow-capped mountains and deflecting the water over terraces. However, no attempt is made at cultivation. The people content themselves with the more abundant growth of the grasses and bulbous plants on whose seeds or roots they feed. Winter is the main hunting season, and the families generally hunt together in communal drives. Rabbit skins are used for clothing and blankets. In the summer, the people wear very little, the men a leather breech clout, and the women a short apron of skin or bark.

The Bushmen also live in small groups on ground which they hold in common. (See Fig. 7·4, page 106.) They move about in search of game and dwell in small wythe-constructed huts that can be easily put up and taken down. Camp is usually pitched some distance from water holes in order not to disturb the game. Women fetch water to camp in ostrich shells. They also go about collecting seeds and grubs. Where they can, the men go out separately to hunt with bow and arrow. Tools are few and simple, made of wood or bone. Clothing is at a minimum, consisting of a small apron. Women also wear a cloak which they can tie in at the waist if they want to carry a baby or the roots they have collected. The cloak acts as a blanket on chilly nights. (See Fig. 7·5, page 107.)

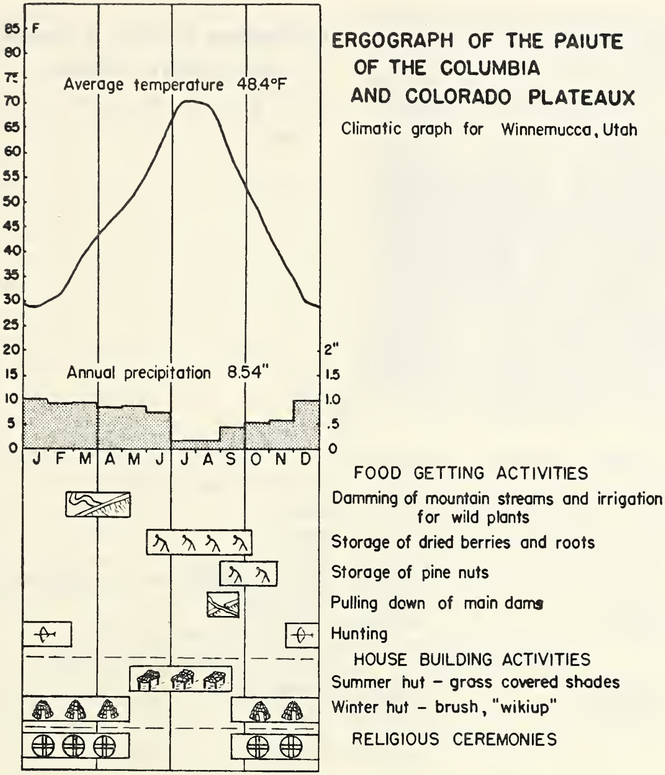


Fig. 7·3. Ergograph of Paiute of the Columbia and Colorado Plateaux.

Since it takes 50 or more square miles to support one person, Bushman population is very sparse. There is a high mortality among infants. Few people live beyond middle age. Families are small. There is little social organization. Religion consists of a belief in evil and good spirits and in trying to induce luck in the hunt. Reverence for the dead is common.

Even more primitive are the Arunta of the Australian desert. They live in small groups of about ten or twelve families and wander from one grove of trees about a spring of water to another. They do not build houses, but pull bushes together or make a crude windbreak for the night. They sleep and work close together; the women making the camp

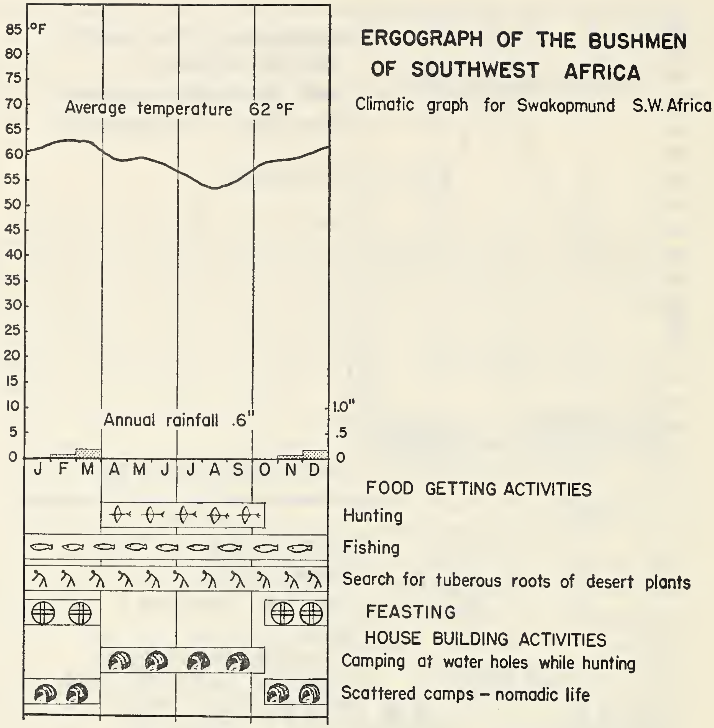


Fig. 7·4. Ergograph of the Bushmen of Africa.

fire, collecting roots and grubs, and cooking; the men hunting kangaroos with spears and boomerangs. No clothing is worn, except on ceremonial occasions, and then only by the men. However, decoration or scarring of the body is frequent. The people are divided into age groups and various relationship classes. They marry in the same age group but in a different relationship class. Their religion is one of a belief in the totem spirits of plants and animals and in ancestors of the tribe. Initiation rites for young aborigines are the occasion of communal celebrations.

Thus it is seen that, in such communities, population is small; the family group is the basis of society; common ownership of the land is prevalent; food is scarce and the diet is simple; houses and tools are rudimentary; clothing is scanty; the arts are not far developed, and religious ideas are rather nebulous and not highly reasoned.

Hunters and Fishers in Cold Regions. In the high north and in remote southern regions, the climate becomes too cold to maintain much land life. On the better parts of the tundra, herds of caribou and reindeer run in the summer but retreat to the *taiga* in the winter. In sheltered valleys, small herds of musk-ox feed. Arctic hare, the arctic wolf, and white fox are also found. But probably the most abundant life is that in the seas and along the land margin, where there are quantities of fish, seal, and walrus, and where the small white whale and the polar bear are also quite common.

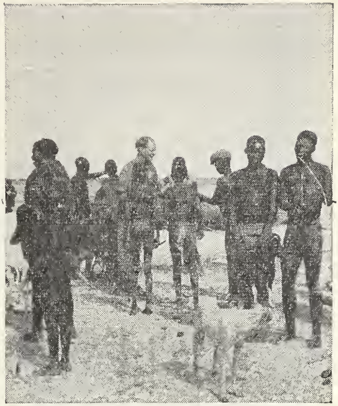


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Fig. 7·5. An explorer talking to a group of Bushmen (men, women and children). Their common wear is a loin cloth and a loose wrap or shoulder-cloak of leather. Dogs assist them in hunting. Note how bare the land is.

In such circumstances, men cling to the coast and turn to the sea for their main livelihood. This is so of the Eskimoes of Canada, Alaska, and Greenland. Their life is closely related to their geography. (See Fig. 7·6, page 108.) Winter, snow, and ice predominate. As winter comes, the Eskimoes go in small groups to sheltered bays where the ice develops in a more or less even sheet. Gradually the ice forms a shelf out beyond the land. It enables the hunter to travel swiftly and easily by foot and by dog sled. Beneath it teem fish and fish-eating mammals like seal and walrus.

Winter hunting commonly follows the **maupok** method of waiting over breathing holes and harpooning seals as they come to the surface. The sea mammals have to come up to the surface to breathe, which they do at holes they scratch in the ice. The holes are usually covered by a thin film of ice, through which the seal breaks. The dogs sniff out the holes and the hunters then put a bone marker on the thin lid of ice and wait quietly near by. At last the seal comes up; the marker bobs in the air; the harpoonist braces himself and then, as the nose of the seal approaches the surface, the harpoon is thrust down deeply. The head of the harpoon is detached from the handle, but a long piece of strong, leather thong is attached to the harpoon head and runs through a tube in the handle. Thus the harpoon head is jerked down by the seal's plunge into the sea beneath the ice. The thong swiftly runs out, but eventually the exhausted animal is drawn up.

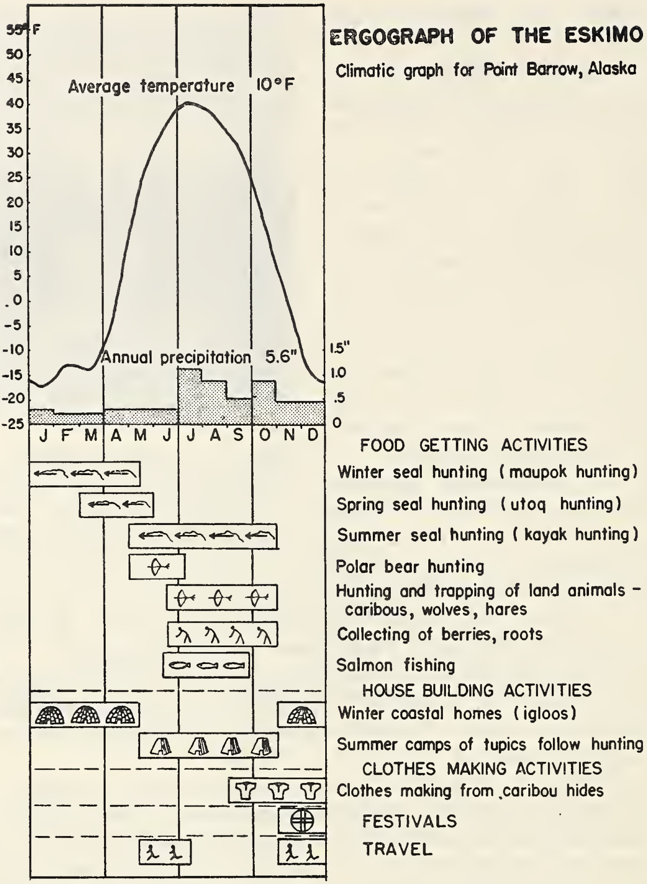
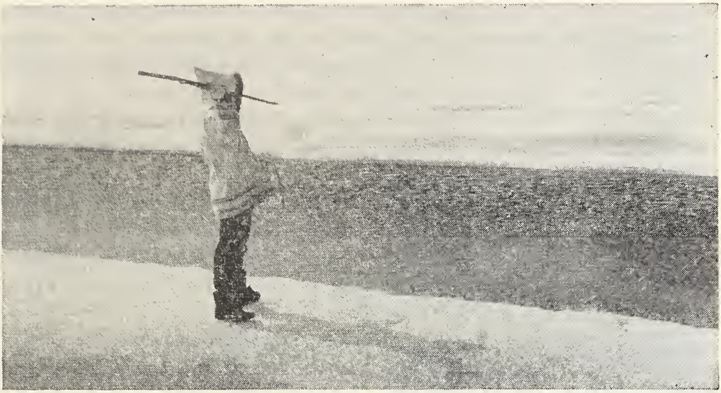


Fig. 7·6. Ergograph of the Eskimo.

As spring approaches, **utoq** hunting is carried on. This is done by stalking the seals. (See Fig. 7·7.) The seals will choose certain areas in which to give birth to their young and to nurse them. Many families of seals may be seen playing and basking on the ice. The Eskimo camp breaks up, and the families go their several ways to stalk the groups of seals. The hunter conceals himself with an old seal skin and patiently crawls up to the seals. When within striking distance, he leaps up and hurls his harpoon at the nearest of the group.



National Film Board

Fig. 7·7. Eskimo stalking seal on spring shelf ice, when "leads" of open water develop.

When summer comes, the ice shelf breaks up and open water appears off the land. This is the time for **kayak** hunting. In their light kayaks, the hunters take to the water and harpoon the seals where they swim together in schools. (See Fig. 7·8.) Should the hunters then sight the white whales wallowing and spouting in the sea, they pursue and harpoon them as well. When a whale carcass is towed in, several families will unite in pulling it ashore and flensing it. The meat is then cut up into chunks and hung over frames to dry. The dried meat may last the families well into the winter, when fresh meat is difficult to obtain.

In the short summer, which lasts about two months, the Eskimoes turn to the land. Here they find many wild berries and edible roots that form a welcome change to the diet. The families also spear or net the

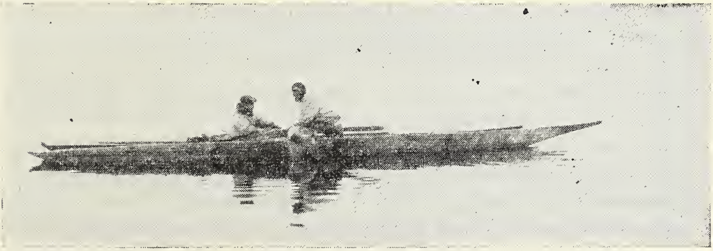


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Fig. 7·8. Eskimo dragging up seal harpooned from summer kayak.

salmon that begin their spawning run up the rivers in great numbers. Then, as the caribou swarm out on the tundra, the Eskimoes converge on them in communal drives. The families come together in large camps. They frighten the migrating herds into shallow lakes where young hunters hidden in reeds wait in their kayaks. Impeded by the water, the caribou are unable to evade the hunters who flash out in their small craft and kill the floundering beasts.

The diet of the Eskimoes obviously depends very much on animal life, as does their clothing. The latter is made chiefly of caribou skin, and consists of trousers tucked into skin boots, or **mukluks**, together with a hooded jacket, or **parka**. Bone goggles, with narrow slits, are worn against ice glare.

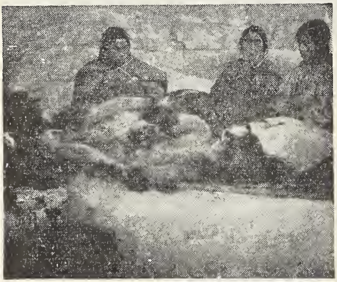

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Fig. 7·9. Inside an Eskimo snow house. The women sit on a shelf of hard snow covered with furs. They are sewing skins. Behind them is part of the round wall of their home, cut from blocks of snow.

In summer, houses are skin tents. In winter, snow houses are built, dome-shaped, with a long, tunnel-like entrance as protection against wind. They are often draped with skins, and skins are also piled on snow ledges for beds. (See Fig. 7·9.) Tools are also dependent on animals, being made chiefly of their bones and sinews. Sledges are built of whale bone, as are the frames of the kayak. Dog harness is made of hide. Fuel also comes from the animals caught, the blubber being melted for cooking oil and for oil lamps.

The Eskimoes live in small groups of from fifty to a hundred people. Most of the families are related to each other, although the individual generally marries outside his group. Two or more families may live in the same house. Each household owns its own goods and tools, but the group owns its hunting area in common and very often shares the spoils of the hunt. Thus individual resourcefulness, patience, and endurance, together with mutual aid and co-operation, are called into play by their way of life.

Where they have come regularly into contact with the white man, their way of living has undergone many changes. They tend to hunt and trap for furs such as the arctic fox and muskrat as well as the seal, and sell these to the trader for cash. With money they buy guns, fishing tackle, knives, cooking utensils, cookers, canvas tents, wooden sleds, woollen or cotton clothing, and canned fruits, vegetables, packaged flour, and sugar.

Although their life is thus made more comfortable, they have, unfortunately, proved susceptible to several diseases transmitted to them through contact with the white man.

PASTORALISM

Although in the dry and cold lands life is generally dependent on animals, most people have passed beyond hunting them to herding them. (See Fig. 7·10.) This provides several distinct advantages. It makes for a safer, surer, more regular life, where people can control the supply of their food and determine their migrations and movements. They may plan to increase or decrease their flocks, change from one kind of animal to another, if necessary, prevent the over-grazing of any area, and by selective grazing, actually improve the natural pastures on which they depend. They widen their diet to include milk, butter, and cheese. They are able to build up a surplus of skins, wool, and hair for the manufacture of cloth and carpets for trading purposes. They have a fairly regular income in this way to spend on grain, other foods, and those necessities or comforts of life they cannot themselves provide.

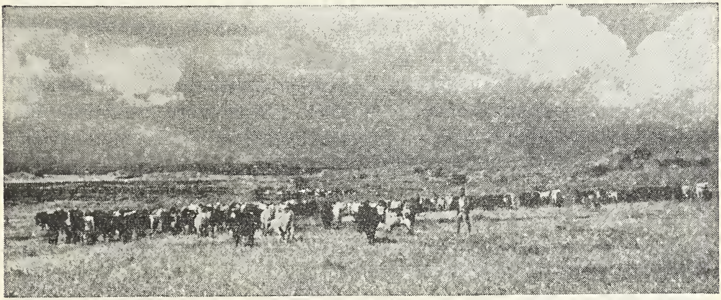

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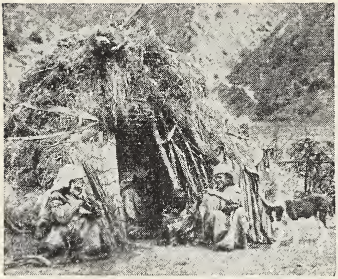
Fig. 7·10. Pastoralists herd cattle on lowland pastures during the winter. The grasses, though dry, are readily available, especially where there is little or no snow.

However, the life does make them very dependent on the needs and habits of their herds, and they do not have the same control over them as the husbandman who can feed his live stock from cultivated hay and crops. For example, in most areas they must follow their herds in the natural migrations from one seasonal pasture to another. In the tropics and sub-tropics where the rains migrate north and south with the zenithal position of the sun, both game and domesticated animals move accordingly. This is a latitudinal movement, and may range over hundreds of miles. In the Arctic, where there is a migration of the snow line, animals also move latitudinally, north and south.

In temperate lands, where there is not the same marked migration of the rains, there is, nevertheless, an altitudinal movement of the snows. In the winter, upper pastures may be covered deep in snow, whereas the valley bottoms and basin lands may still be green. Then the animals move down the slope. In summer, the lowlands may be burned brown by the heat of the sun. Then the droves of animals mount the slopes to the green pastures remaining on the hills, and the herdsmen follow them. Summer huts are set up, and people live in temporary camps. (See Fig. 7·11.)



Ewing Galloway

Fig. 7·11. In summer, pastoralists migrate with their herds to alpine pastures. Since they are not up in the mountains for long, they frequently use only temporary shelters, as does this family in their summer home in the highlands of central Asia.

It is no wonder, then, that the life of these dry and cold lands has been described as one of wander. This is a principal characteristic and is known as **transhumance**. It goes along with the rights of groups to land which they use but a part of the year, and with the drove roads that lead from one grazing area to another. Thus more regulation and organization are required among pastoralists than among hunters, and they have a well developed society, with distinct rights and systems of regulation.

Since the herds are relatively large, population is greater than amongst hunters, and people move about in comparatively large groups. Their welfare depends on keeping the herd together and therefore rests on joint activity. Custom has taught them that this can best be preserved under the rule of a chosen or otherwise respected family. Very often the patriarch of this family becomes the ruler of the group of associated families who move and herd together. He rules in council with the headmen of each of the related families. This system, known as the **patriarchal** one, is very common among pastoral groups.

Pastoralism is found in the semi-arid steppes and tundras of North America, Europe, and Asia; in the semi-arid savannahs of South America, Africa, and southern Asia. In North America it is an introduced culture, for, until the white man brought in domestic sheep, cattle, and at length, reindeer, North American Indians had not learned to domesticate animals, save for the dog. Today the Navaho in the south-west are sheep herders and the Eskimoes in the north-west are learning to be herders of reindeer. In South America, the Incas domesticated the llamas. "Their number was immense" says Havemeyer. "They were scattered over the different provinces, chiefly in the colder regions of the country, where they were intrusted to the care of experienced shepherds, who conducted them to different pastures according to the change of season. The herding of alpacas and llamas is still active amongst the Indians of the Andes."

However, pastoralism has been most prevalent in Eurasia and Africa. It is mainly an oriental way of life. Very early in history, the people of the Near East learned to domesticate sheep, cattle, horses and camels. The Bible describes how successful they were and how, when one group got so many flocks and herds as to make their management difficult, it would split and a new group would wander off to find new pastures. Probably in this way the mode of life spread westwards across the Sahara and eastwards over Arabia and Persia. Similar movements occurred westward and eastward out of central Asia.

Today, **typical pastoralists** are the Bedouins of the Sahara and Arabia, and the Kazaks, Khirgiz, and Mongols of central Asia. (See Fig. 7·12, page 114.) These look after the large herds of camel or of sheep, following their migrations north or south with the rains or, as in Asia, up and down the hills and basins. They live in large encampments of skin or felt tents stretched over light poles; they feed on milk, cheese, and meat, with imported flour; they dress in robes of wool, with leather jackets in the winter; they collect wool and hair to sell, or to make felt, cloth, rugs and carpets, and offer them for trade. They wander from water hole to water hole.

Since many oases dot the region and there are other tracts of watered land, sedentary life goes on side by side with, and occasionally along with, a nomadic one. In Arabia they speak of the *arab* or nomadic tent dwellers who live out on the open range, of the *hadhar* or agricultural peasants who live in permanent villages of brick buildings in the oases, and of the *qarauna*, who live in villages in summer but then move off to winter pastures and dwell in tents. Similarly, among the Khirgiz, in addition to the nomads, there are semi-sedentary pastoralists, who keep to villages in the winter and then have a camp life on the high ranges in the summer. The old people, however, often stay in the village all year.

Reindeer herding is the pastoralism of the Lapps in northern Europe (See Fig. 7·13, page 115.) and of the northern Siberians. They live a nomadic life, dwelling in skin tents, making their clothing from reindeer hide, fashioning many of their tools from its bones, and living on its milk and

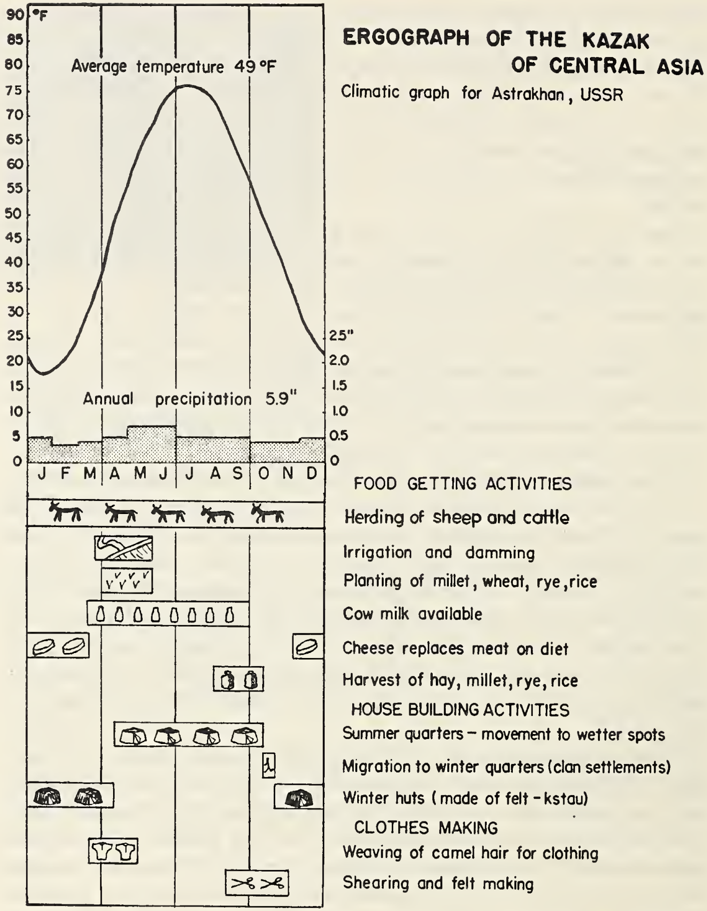
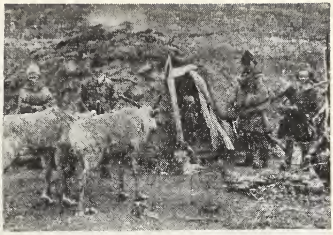


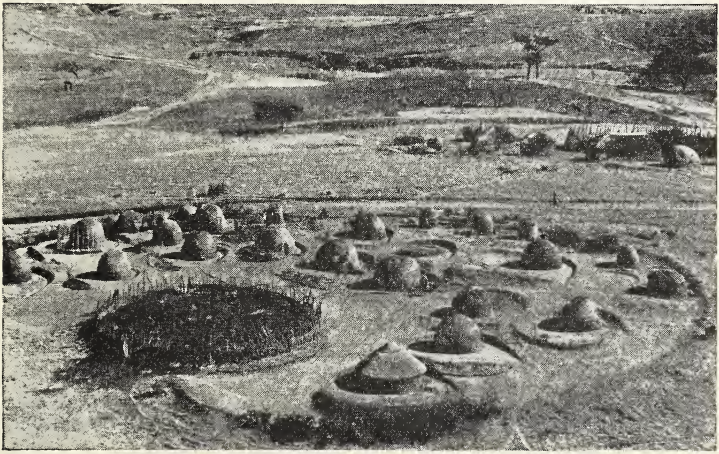
Fig. 7·12. Ergograph of the Kazak of central Asia.

meat. They may do some fishing and hunting, in addition, to supplement their diet. The Tungus live in large tribes divided into clans, each with its own herding and hunting territory. The reindeer are shared among the families making up the clan. The whole group is ruled by the headmen in council. Thus co-operation amongst the families, and yet their subordination to the overall needs of the tribe, are together maintained, In **eastern and southern Africa**, many pastoralist tribes live on the savannah. Chief among them are the Masai, Zulus, and Hottentots. These are all cattle herders. Their herds are their health and wealth, and they tend them with great care. They live in villages of small, round huts made of woven sticks, often roofed over with compacted mud. The villages are surrounded by a high thorn hedge to keep out predatory animals. Within these are **kraals** for the safety of the cattle by night. (See Fig. 7·14.) By day the cattle are driven out to pasture. Meat and milk are the mainstay of their diet. Many utensils and much clothing are made of skin. Sheep and goats are also kept. Again, in well watered places a semi-sedentary life is carried on and corn or millet are planted and harvested.



Ewing Galloway

Fig. 7·13. The reindeer herders of the tundra pastures live a wandering life. They build relatively temporary, humble homes, such as this sod-covered hut with its Lapp family and reindeer. Notice how the clothes are designed to keep out cold and wind.



Ewing Galloway

Fig. 7·14. Cattle enclosure within a Zulu kraal on the grasslands of the southern African plateau. A part of the old boma, or thorn hedge, that used to circle the kraal for defence against raiders and wild beasts is still in evidence.

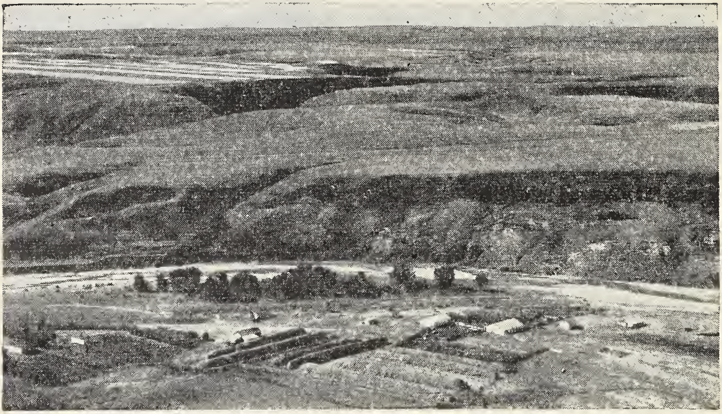


Fig. 7·15. A Canadian ranch, nestling in a valley in the short-grass plains near the Rockies, Alberta, shows a large number of buildings, including the main house on the left, the foreman's house, a bunkhouse for the cowboys, and barns and sheds. Large ricks of hay for winter feeding are next to the corrals. Feeding racks are nearby, laid out in the fields. Beyond these is the open range.

Cattle and sheep ranching in a commercial way have replaced hunting or nomadic pastoralism in large tracts of semi-arid steppe in the Americas, southern Africa, and Australia. It is at present chiefly an occidental pursuit. Here the ranch unit is a large group of buildings where the owner provides individual accommodation for married employees with their families and communal bunk houses for the ranch hands. Around the ranch, there are large corrals in which the cattle and sheep are pounded for branding or for shipment to the station or the market. (See Fig. 7·15.) Beyond these lie some fields of seed hay or clover, from which the natural pastures may be rejuvenated, or of irrigated pasture to supplement the natural range at seasons of scarcity. Beyond these lie the open ranges, extending back to the hills. The ranch is usually many thousands of acres in extent to allow for the change of pastures within its own limits, the cattle being driven from one to another to prevent overgrazing and in accordance with seasonal needs.

However, should the basic part of the ranch be too small or limited for this movement of live stock, then the rancher will have, or will hire, a remote pasture up in the hills or at some remove, where there is more space. Each spring he drives or entrains his animals to the summer pasture. Each fall he brings them back to the main feeding grounds at the ranch buildings.

The cattle are sold for meat and hides. Clippings of wool are sold, and then the sheep are marketed for meat. No attempt is made to confine the diet, clothing, or utensils to derivatives from the stock, but with the cash obtained from the sale of stock, all desired necessities of life are bought and imported to the ranch.

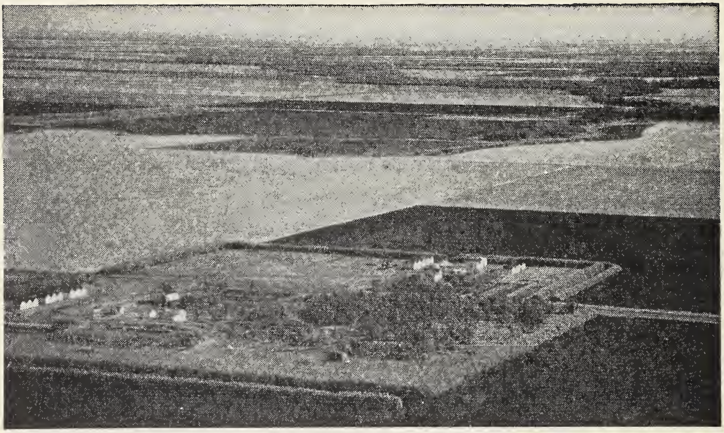
AGRICULTURE

Agriculture is not very important in the dry climates and is absent from truly cold ones. For long it served as a subsidiary source of food, conducted in a primitive way, often by the women of the pastoral tribe. However, two significant forms exist: oases agriculture and dry farming, both of which are expanding.

Oasis agriculture is found in the deserts of the Northern Hemisphere. Wherever a spring or series of springs comes to the surface, plant life is very active, especially under the clear, sunny skies and in the hot weather of the tropical deserts. Tall palms and dense masses of reeds probably formed the original vegetation, but because space is so limited, man has replaced these by certain palms, cereals, and vegetables that give a maximum yield of fruit. Millet, maize, and rice provide a high return of grain. Interculture is frequently practised. Irrigation carries the water as far as it will extend. The houses are crowded together into closely packed, many-storied buildings to save as much space as possible for agriculture. Little land is wasted on animals, and the land is mainly worked by hand, the threshing and even grinding of the grain often being left to human labour. However, round the outskirts of the oasis, goats, sheep, and camels may be grazed and add meat and milk to the diet. The oases are densely populated and are usually the market towns and capitals of the nomadic countries.

Dry farming is a method of commercial farming widely used in occidental countries in order to extend the agricultural area onto the semiarid steppe. Its basic principle is to conserve as much moisture in the soil as possible and at the same time, to exhaust the fertility of the soil as little as possible. As described by John Bracken, for Canada it consists essentially of the practice of summer fallowing. This leaves each field unplanted for one summer in turn with the other fields. The rain that falls on the fallow field is stored up as soil moisture so that the next year, when the field is planted, there should be two years' rainfall available to the crop. Actually about half the rain falling on the fallow is lost by evaporation, and thus only one-and-a-half time's rain is really available. This, however, is a considerable item in a dry climate.

The moisture is preserved in the fallow by the use of a duck-foot cultivator. This machine stirs and then ridges up the top layer of the



National Film Board

Fig. 7·16. Use of windbreaks and grass strips in fields in arid prairies to prevent erosion.

soil, preventing the loss of soil moisture by capillary attraction from below the surface. At the same time, it throws the turned-up weeds into hollows between the ridges and thus further prevents evaporation. The ridges stop loss of top soil by wind erosion. (See Fig. 7·16.)

When the weeds are destroyed in this way, the crop planted the following year goes into clean land and thus yields a high return. For some areas where the growing season is short, a second crop may be sown in the late summer and is therefore ready to grow up quickly the following spring.

Of course, to put land in fallow is to put it out of production. In humid climates, the same field can produce year after year through a rotation of crops. In dry farming, a field lies vacant every so often and produces nothing. To overcome this disadvantage, farms are very large, often a square mile or more in extent. Thus what they lose in yield per field they make up in the number of their fields. Consequently, dry farming is generally associated with large-scale production using many large multi-disced ploughs and combine reapers and the use of transient labourers at harvest time to help take in the harvest.

The farm has big buildings, with large machine sheds, a gasoline pump, big barns, bunk houses for the transients, and garages for the trucks and tractors. Heavy capitalization is required, and to make this pay, great care has to be taken with the land. Wind breaks of trees are planted, or long strips or banks of grass are left in the fields to prevent wind erosion. (See Fig. 7·16.) Every effort is put into the cash crop, and no farm cattle are raised. There may not even be a vegetable garden or a lawn about the house. The family depends on the cash raised to supply it with milk, vegetables, fruit, flour, and other foods. Winter is, therefore, a quiet season with no stock to look after, and many farmers take a holiday at that time in the city or at the coast.

The farms are relatively isolated; population is very sparse. Yet the farm needs many services, and so a number of market towns exist, usually at the meeting of railway and road where elevators, oil tanks, and machine shops are set up to serve a wide area. The landscape has a rather spare, empty look, compared with the farming countryside in a humid climate, and dry farming cannot be counted on to extend settlement very appreciably from the humid into the dry lands.

LIFE IN MOUNTAINOUS REGIONS

The settlement of mountainous regions has also many limitations. Mountain terrain is included in Fleure's *zone of difficulty* and life is indeed difficult there, challenged as it is by steep slopes and rocky barriers. Movement is difficult and limited to valleys and to passes across the mountains. Expansion of any field of endeavour requiring space is restricted by the nature of the terrain. When the available space is occupied, saturation point is reached for that particular area, an impasse rarely encountered on the plains. Occupations are more nearly determined by the environment than elsewhere. In fact, as Geddes points out, they follow the valley section, with fishing in the lake or along the river side at the bottom of the valley; the main settlements and roads on the terrace just above the flood plain; crop agriculture on the remainder of this terrace and up the lower, gentler slopes, as high as temperatures will allow; the pasturing of cattle and sheep above the line of orchards, unless this should compete with forest activities; the summer pasturing of animals on the high alpine pastures above the tree line; and then the waste land of the eternal snows.

This valley section is closely followed whether under an oriental or occidental culture. In oriental lands, crops may be carried farther up the slopes by terracing and there may be no connection between the peasant of the valley and the shepherd of the hill; in occidental lands, the lowland farmer may raise silage crops and keep winter pasture for flocks that he tends, in summer, on the high alps. Apart from relatively minor features like these, however, settlement, cropland, forest, and pasture are controlled by relief, and mountain lands have, therefore, much in common, the world over.

QUESTIONS

A

1. Name the countries included in the dry and cold climates.
2. Which continent suffers least from their combined effects; which most?
3. What are the main food-getting activities of the Paiute Indians? What relationship do they bear to the climate? (See Fig. 7·3.)

B

4. Compare and contrast the seasonal rhythm of work, in relation to climate, of Fang, Tungus, and Paiute.
5. The Fang and the Bushmen both live in Africa: what differences occur in their way of life, as represented in Figs. 7·4 and 5·10? To what extent are these differences due to climate?
6. Write a brief account of the activities of an Eskimo during a normal year, based on, and with specific reference to, Figs. 7·2, 7·6, 7·7, 7·8, and 7·9.
7. Tell the story of the life of the Kazak from the ergograph in Fig. 7·12.
8. How has dry farming affected the life of the dry lands? (Figs. 7·15, 7·16.)

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CHAPTER VIII

World Agriculture

Geography of Agriculture. Man has nowhere affected the earth more than in agriculture. Here he has changed the pattern of plant and animal life, has drained marshes, irrigated desert, altered soils, and produced a new, a continually renewed, landscape. Therefore any description of the earth, such as geography is, must take account of agriculture. The distribution of the great agricultural systems sets its stamp on the scenery and helps to explain also the distribution of population and of well-being throughout the world.

Agriculture reacts closely to topography, drainage, climate, and soil, and also to different human cultures and stages of development. It is one of the best indicators both of the natural and of the social environment. Agriculture varies in broad belts from the equator to high latitudes, from the coasts to the continental interiors, and from low-lying land to high altitudes. It changes according to the needs, abilities, and tastes of men. It is characteristic of civilized life, requiring as it does considerable skill and organization. Amongst civilized men, it varies between oriental and occidental practices, between highly individual and collectivized systems, and between subsistence and commercialized types. In describing its geography, many or all of these factors must be considered.

CROP AGRICULTURE

Food Crops: Grains. In Europe, it has long been held that wheat is the staff of life. This is because it was widely grown in the Mediterranean, the cradleland of European civilization. Wheat spread thence wherever Europeans settled: in Siberia, in Canada and the United States, in South America, South Africa, and Australia. However, rice is regarded as the staple diet by even more people: the millions of monsoon Asia. Millet is probably the staple of most agricultural tribes in Africa. Maize was the staff of life for the natives of the Americas and vies with wheat today. As for oats, though it is, as Dr. Johnson pointed out, only fit for horses in England, it is the national diet of Scotland! Thus the tastes of people have a very great deal to do with the geography of grains. This however, does not mean that the physical environment can be ignored. On the contrary, every people has the task of adapting its diet to its climate and soil. The European does not grow wheat where he can grow maize better; nor does the American grow corn where he can grow rice better; nor does the East Asian grow rice where he can grow millet better. Every crop is adjusted to its own requirements.

WHEAT. (See Fig. 8·1.) Wheat was originally a temperate-zone grass, growing in the grasslands of the Old World and in grassy glades in more open woodland such as the sclerophyllous scrub of the Mediterranean. When cultivated, it spread both to the more arid regions, bordering the Asiatic, Arabian, and African desert and also to the more humid regions of western Europe. Thus different breeds of wheat have been developed to give it a wide range. However, there are certain optimum conditions for it. These are moderate rainfall, moist soil in the early growing season, and warm, sunny weather during the ripening period.

It has been noted that the ideal range of precipitation is between 15 and 45 inches; below 15, there is not enough to produce a good yield, unless evaporation is low; above 45, the danger of mould and rot is too

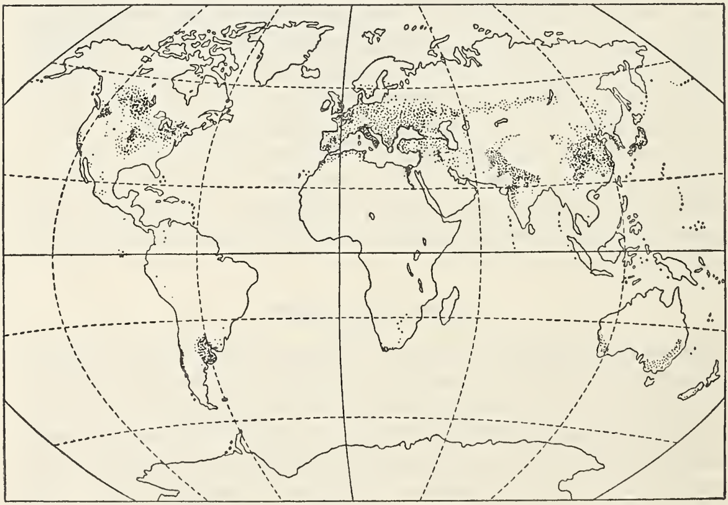

Fig. 8·1. The world distribution of wheat production.

great, and diseases reduce the yield. In drier climates, it may be grown by the summer fallow method described. (See Chapter VII.) In wet climates, like that of India, it may be grown in the dry season.

The temperature is also important. It should be over 60° F. for the period of active growth. Cooler temperatures make too much growth go into stalk and leaf and insufficient into the grain. High temperatures may shrivel the wheat kernels, especially if coupled with drying winds.

Temperature conditions decide when wheat is planted and harvested. Where the growing season, or frost-free period, is short, "spring" wheat is raised. This is seeded as early as possible so that the wheat may mature before the killing frosts of fall. The frost-free season should be more than 100 days for extensive commercial production.

Winter wheat is grown where winters are rather milder or where there is a deep snow cover to protect the grain. Sown in fall, it starts its growth even before winter. Held in check by winter, it springs up quickly in the early summer and is cut in the following fall. Winter wheat has a certain liking for winter, called "winterness", and is not successfully grown in truly tropic lands.

Moisture content decides, to large extent, the protein content of the wheat. This is distinctly higher in drier, warmer climates than in humid, cool ones. Thus western Canada and Russia, with relatively dry cool climates, produce "hard" wheat, rich in protein. (See Fig. 8·2.) Eastern Canada and western Europe, on the other hand, produce "soft" wheat, poor in protein but richer in starch. Hard wheat is much sought after for bread-making; soft wheat, for the making of pastries.

In North America, there are four wheat-growing areas: the eastern, producing soft winter wheat under humid conditions with a relatively

Canadian Pacific Railways

Fig. 8·2. Wheat farming in Canada takes place chiefly in the cool, sub-humid interior lowlands, ideally suited to hard wheat production.

mild or snowy winter; the southern central hard winter wheat region, with less than 30 inches of rain, and moderate temperatures; the northern central hard spring wheat area, with between 15 and 30 inches of rain, very severe winters and short, but warm, bright summers; the western mixed-varieties region, relatively dry and mild in climate—where varieties depend very much on local relief.

The principal wheat-growing areas of the world are the humid and semi-arid temperate grasslands, such as the Prairies of Canada, the Great Plains of the United States, the Steppes of Russia, Siberia, Manchuria, and northern China, the Pampas of Argentina, the Veld of South Africa and the Murray-Darling Plains of Australia. Wheat is grown in tropic Asia (Pakistan especially) in the relatively dry, cool winters after the monsoon and before the great heat of early summer.

OATS can grow in a cooler and moister climate than wheat and so are found along the northern fringe of the wheatlands, especially in north-west Europe, which is cool, cloudy, and wet even in summer. Oats do not do so well in hot, dry climates and so are not grown extensively in subtropical or tropical latitudes. However, oats form an excellent rotation crop, especially with maize, and therefore are characteristic of the corn belts of the world.

BARLEY has a wider range than oats, being found in very cool and also quite dry climates. It is often grown in rotation with oats in northern areas or wheat in southern regions in this hemisphere. It has a higher yield than oats or spring wheat.

RYE will respond to rather poorer soils and more extreme conditions than wheat or oats. It is commonly grown in northern Russia. It is often used as a winter cover crop or as a green manure to be ploughed into the land. It helps to kill weeds. It is frequently rotated with spring wheat and oats in western Canada.

MAIZE OR CORN. (See Fig. 8·3.) In corn, the world has one of its chief assets, although modern man seldom realizes what he owes the Indian for this. However, it has been said that, "The greatest plant-breeding job in the world was done by the American Indians. Out of a wild plant not even known today, they developed types of corn adapted to so wide a range of climates that this plant is now more extensively distributed over the earth than any other cereal crop."

However, although varieties have been bred for tropical and subalpine climates, for dry and for humid regions, the successful *commercial* production is limited chiefly to the warm temperate or warm-summer cool temperate humid climates. It is not economic to grow it where the mean summer temperature is less than 66°F. Corn does best where the mean temperature of the ripening season is between 70° and 80°F. In

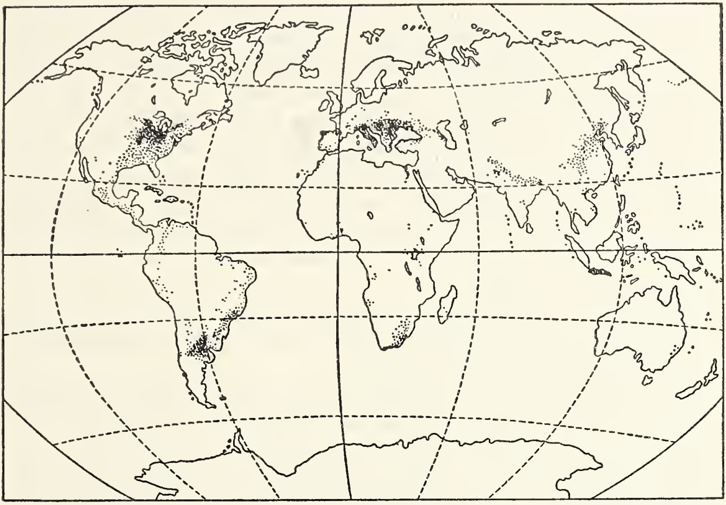

Fig. 8·3. The world distribution of corn or maize production.

temperatures much above 80°F., yields drop. This is especially so in a very dry season when the corn tassels are killed and no pollination can occur.

Corn likes a fairly humid climate with between 25 to 50 inches of rainfall. But it is very particular. It likes the rain to fall chiefly at the beginning of the season and then to slacken off. Also, it prefers the rain to fall at night! Climates with early summer cyclones, mid-summer convection rains that occur mainly in late afternoon or evening, and with a bright, sunny fall are favoured. Such conditions usually prevail in the prairies of the American mid-west and in the middle eastern states and the Great Lakes-St. Lawrence lowland.

Corn is grown extensively in the mid-latitude, warm summer, humid lands. Nearly half the world's total is raised in North America; central and south-eastern Europe also grow large quantities as do northern China and Manchuria. Some corn is produced on the Indo-Gangetic plains of Pakistan and India. In the Southern Hemisphere, Brazil, Uruguay, Argentina, and South Africa are important producers. A large portion of the corn of the world is used for cattle and hog feed because the thick leaf and oil-rich kernel have excellent nutritious properties and thus give high yields of prime meat. It is significant that, as with corn, more than half the swine of the world are produced in the United States.

MILLET. This is the crop of the drier tropics. As a grain crop, it is known as sorghum in North America. It can also be grown for use as fodder or for the production of syrup. It is ideal for the dry savannahs of Africa and Asia, its homelands, and has spread to the subtropical and tropic steppes of the Americas. It has very special qualities that enable it to lie dormant during a dry spell and then spring up again and continue growing when there is a shower of rain. Millet transpires very little and thus loses little of the water it draws up from the soil. It has a large number of widely spreading roots that can draw up water from depth. It possesses a thick skin that prevents drying out of the plant by evaporation or hot, dry winds.

The highest yields require a high temperature of from 80° to 85°F. If summers are cooler than 75°F., millet fails. The rainfall required is 12 to 14 inches during the crop year.

RICE. (See Fig. 8·4.) As has already been indicated, more than 90 per cent of the world's rice comes from the monsoon lands. There it finds the combination of a high summer temperature, over 80°F., with high rainfall, usually over 60 and up to 500 inches. Level land that can be readily flooded and a clayey soil that holds the moisture are also essential. The fields are ploughed at the onset of the rains. The rice seedlings are transplanted from their nurseries to inundated paddies. Rice must

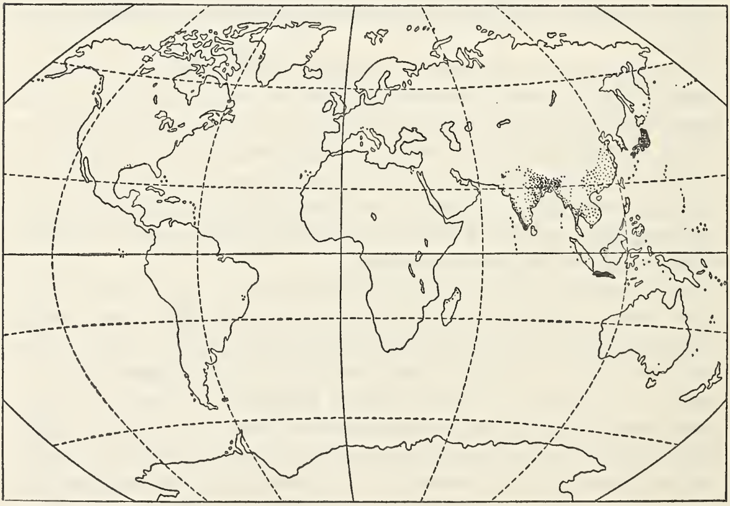

Fig. 8·4. The world distribution of rice production.

grow under water. However, as the monsoon slackens, the rice accustoms itself to less moisture and puts all its growth into its seed. A high yield is thus obtained from even a small area of land.

In the equatorial climates, where rainfall is more constant and where there are two distinctly wet seasons, in spring and fall, two crops of rice a year can be raised. This abundance explains why rice is becoming so popular in Indonesia and East Africa. Some rice is grown in eastern South America, Central America, the West Indies, and the gulf coastal plain of the United States, but on the whole, it is not suited to occidental tastes or methods of cultivation.

SUGAR. Sugar is derived from two crops: sugar-cane, in the tropics and subtropics, and sugar-beet in temperate lands. SUGAR-CANE is grown between approximately 32°S. to 38°N. It is believed to have had its origin in Melanesia and thence to have spread in early times through the East Indies and south-east Asia to India. Thence it was carried to the Mediterranean, its most northerly home, and from there to the West Indies and the Americas. At the same time, it was spreading through southern China to southern Japan, the Philippines, and Hawaii. These lands, together with east Africa and northern Australia, are today the chief producers. The cane requires a fairly long growing season, a hot summer with either ample rain or good irrigation, and dry sunny spells for harvest. The West and East Indies are the principal producers.

SUGAR-BEET, a much hardier plant, grows on the northern fringe of the warm temperate zone or the warmer belt of the cool temperate zone. It has a range in this hemisphere of from 35°N to 60°N. It apparently originated in western Asia or Caucasia and spread to the Mediterranean, central and western Europe. It was also carried to southern Russia, where it is extensively grown. Later it was transplanted to the United States and Canada. (See Fig. 8·5.) Very little of it is grown in the Southern Hemisphere.

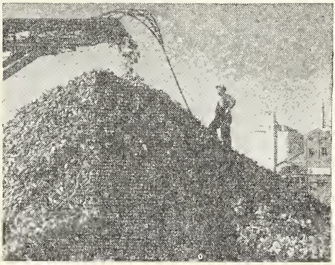

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Fig. 8·5. The temperate lands have become major producers of sugar through the cultivation of sugar beets. Canada's production is chiefly from southern Manitoba and south-western Ontario. Here beets are being piled up ready for use in the factory behind.

In Canada and the United States, the principal sugar-beet area is in the midwest and eastern regions, bounded by the mean summer isotherms of 67°F. on the north and 72°F. on the south. The sugar content increases when a cool fall follows a warm summer or when a dry period follows a rainy one. Consequently production tends to be concentrated in the northern or higher regions and in California.

Food Crops: Fruit. (See Fig. 8·6.) Fruits are a valuable part of the diet of most people but seem to bulk largest in the European and American eating habits, with a fair representation in those of Asia and North Africa.

DATES, BANANAS, AND PINEAPPLES are probably the most important fruits of the tropics, the first growing in the semi-arid, the last two in the humid regions. Both the date and banana cease to grow below 50 °F. and need about 5 months over 64·4°F. in which to ripen. Pineapples can stand slightly cooler conditions and are favoured by constant humidity. Date production is greatest in Mesopotamia, North Africa, and California, and Arizona; banana production, in the West Indies, Central America, and West Africa; pineapple production, in the West Indies and Oceania.

CITRUS FRUITS, OLIVES, AND FIGS are subtropical products. They need hot weather in which to ripen. Nevertheless they appear to require some cool weather and do not yield well in wholly tropic climates; since they cannot stand cold winters, they do not grow in temperate lands.

Because of the high vitamin value of grapefruit and orange, the citrus industry is probably the most highly developed branch of fruit farming.

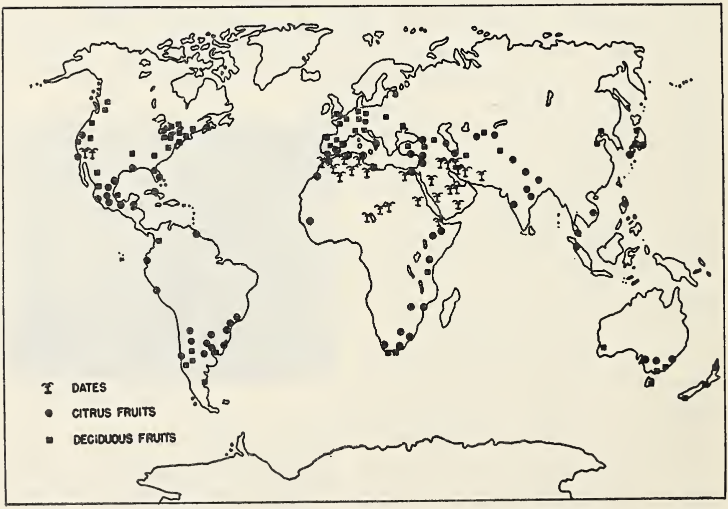

Fig. 8·6. World distribution of dates, citrus fruits, and deciduous fruits.

All around the Mediterranean, but particularly in Palestine, Sicily, and Spain, and also in Florida, Texas, and in California, extensive orchards are found. They also occur in the Cape Colony of South Africa and in central Chile. The Tangerine oranges are widely grown in southern Japan.

The critical temperature for citrus growth is 55°F., the optimum temperature being between 73° and 91°F. Summers must be bright and sunny without too much rain. (The Mediterranean summer is ideal, provided the plants have enough root moisture.) Then all growth goes into the fruit. Winter temperatures, if low, may kill the plants, and this usually decides their poleward range. Limes cannot stand a winter colder than 28°F.; lemons, 26°F.; orange and grapefruit, 24°F.; and Tangerines, 22°F. Since cold waves often sweep down from Canada to Texas and even northern Florida or move down from the mountains to the California orchards, the groves are heated by flares on frosty nights to prevent winter killing. Citrus fruits require about 30 to 35 inches of water. Should the rainfall be less than this, as in California, irrigation must be practised.

FIGS can withstand winter temperatures as low as 15°F. and thus have a wider range from the subtropics to parts of the temperate zone. However, they are very sensitive to spring frosts and so tend to concentrate in sheltered slopes with good frost drainage, in subtropical lands. If figs are grown for drying, they must be raised in hot, sunny lands, where, in the height of the season, temperatures should rise to over 100°F. At this time, there should be no rains; the dry summer, Mediterranean type of climate is ideal. West Asia, the Mediterranean, and California are the chief producing regions.

PEACHES, CHERRIES, PLUMS, PEARS, AND APPLES are the principal fruits of temperate humid lands. All of these have the quality of "winterness" and require a dormant period during winter if they are to develop fully. Nevertheless, each has a specific degree below which temperatures cannot fall without injuring or killing the plant. This minimum marks the northern limit of the fruits. Where minima fall below −30°F., as in the Canadian Prairies and the valleys at the edge of the Canadian Shield, apples, sour cherries, and American plums fail. Where they fall below −20°F., pears, sweet cherries, and Japanese or European plums cannot succeed. Where they reach −15°, as in most of Ontario except for the Niagara Peninsula and the Leamington district, peaches and apricots are unlikely to survive.

The summer temperatures required range from about 65° to 80°F., and, should they be cooler or hotter, yields are less. All the fruits require considerable soil moisture, equivalent of about 30 inches of rainfall.

Canada Department of Agriculture

Fig. 8·7. Fruit orchards in the Okanagan Valley, B.C. These are watered by sprinklers from conduits coming off mountain streams.

Where the precipitation is distinctly lower, as in the Okanagan, (See Fig. 8·7.) irrigation is required for commercial yields.

Food Crops: Beverages. (See Fig. 8·8.) Tea, coffee, and cocoa are three of the main crops supplying the world with its beverages. They are subtropical to tropical in nature.

TEA is a bushy plant that grows on hillsides in hot, wet lands. It requires plenty of rain throughout the growing season, together with sunny spells. It developed in the monsoon lands where it had the added advantage of supplying a use for slopes or soils that could not be put under rice. Since it needs much labour for picking and curing, it is generally cultivated in regions of dense population. It is the national drink of the Chinese and Japanese. It spread to central Asia and Russia in mediaeval times and to western Europe in the eighteenth century. The British soon became great tea drinkers

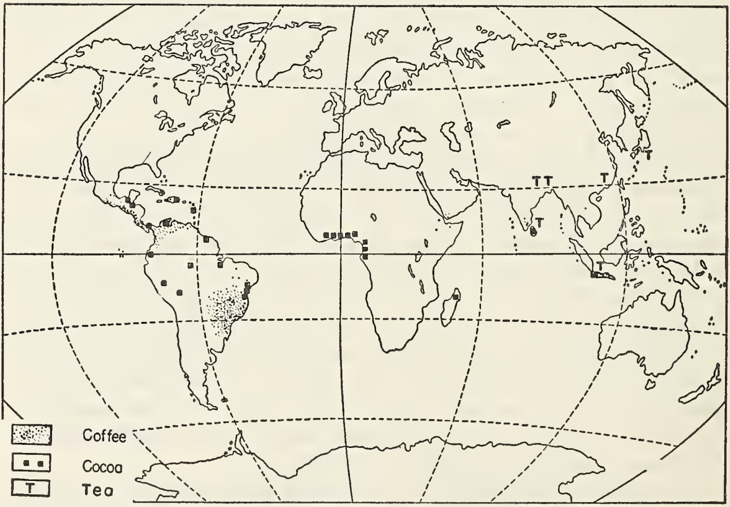

Fig. 8·8. World distribution of tea, coffee, and cocoa production.

and they established plantations in India and Ceylon. The Commonwealth is still the main market for tea.

COFFEE probably originated in Yemen, Arabia. It became popular throughout the Middle East and was much sought after by Europeans in the eighteenth century. They carried its production to east Africa, the East Indies, the West Indies, Central America, and Brazil, which are today the chief producing regions. Brazil raises two-thirds of the world's crop. There on the humid, tropical plateau, a rich well-drained soil, formerly developed under forest, warm but moderated temperatures, and ample moisture well distributed throughout the growing season but slackening off after harvest, give many natural advantages. Nearer the equator, coffee trees are damaged by the intense rays of the sun and have to be shaded by special shade trees that grow above the orchard rows. The American, Mediterranean, and Arab nations are the chief coffee drinkers of the world.

COCOA is derived from the cacao tree that grows in humid equatorial lands. It does best in the deep alluvial soils of valleys in hot, wet areas. It requires larger cover trees to protect it from intense insolation and winds. Much hand labour is needed in cutting down the cocoa pods, splitting them, releasing the cocoa beans, and curing the cocoa. (See Fig. 8·9.) Consequently, production is centred in the fairly populous lands of West Africa, the West Indies, Central America, and south-eastern Brazil. Cocoa and chocolate are much in demand in Anglo-America and in Europe.

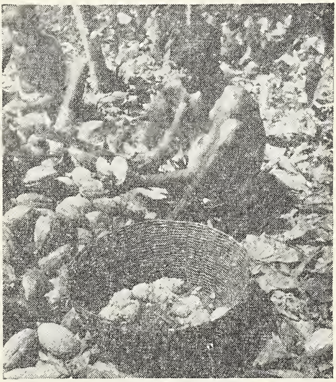
British Information Service

Fig 8·9. Extracting cocoa beans from the pods of the tree, west Africa.

Industrial Crops: Fibres. FLAX, from which linen is made, is one of the oldest crops grown for its fibre. Native to western Asia, it was early introduced to the Mediterranean, North Africa, and eastern Europe. It has been largely displaced in the warmer lands of its home by cotton, and its chief production today is carried on in cool temperate regions in Russia, central Europe, and Ireland. It requires a rich soil that must frequently be fertilized, moderate rainfall, and warm, but not hot, summers. Flax cultivation was carried to the United States and Canada and was also introduced to subtropical lands such as India and Argentina. However, subtropical temperatures are too high to produce a satisfactory fibre, and

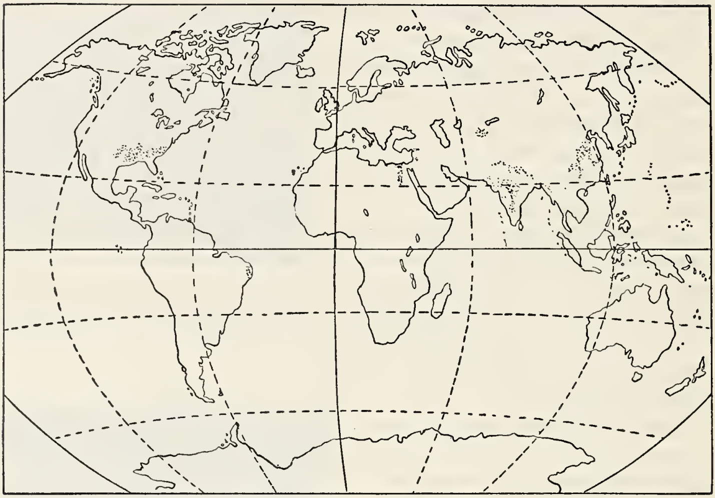

Fig. 8·10. World distribution of cotton production.

in these lands, the crop is raised for its seed, from which LINSEED oil is derived.

COTTON is the most important of the fibre crops of the world. (See Fig. 8·10.) Its commercial distribution is limited to subtropical regions with summer temperatures of 77 °F. to 85 °F., a frost-free period of 210 days, a rainfall of not less than 20 inches but not more than 65 inches, with a distinctly dry autumn, and sandy loam or alluvial soils. However, various types of cotton have their own special requirements. Sea-island cotton demands a humid climate; Egyptian cotton, warm, arid regions with a long growing season; Upland cotton meets the requirements outlined above; Asiatic cotton grows in slightly hotter, less humid conditions. The main producing regions of the world are southeastern United States, India, Egypt, North China, Russian Turkistan, the West Indies, and Peru. The principal manufacturing areas are northeastern United States, western Europe, and Japan, although India, China, and the southern states of U.S.A. are rapidly developing their textile industries.

JUTE is a coarse fibre grown almost exclusively in the very hot, wet, deltaic areas of India and Pakistan. It is widely used for making bags and for industrial purposes. SISAL is another tropical fibre. A native of Yucatan, it has now spread through Central America, the Bahamas, Hawaii, India, and West Africa. It needs a hot summer with plenty of sunshine, especially in the fall when the fibre is dried out. It looks like a century plant and grows best in a dryish climate with a good supply of ground water. It is widely used for making ropes.

ANIMAL CULTURE

Although most of the world's farmers concentrate on plant culture, a considerable number go in for stock raising. Many of these are pastoralists who keep cattle, sheep, and other animals for their own food and clothing. Many engage in the commercial production of wool, hides, and meat. This last activity has increased enormously because modern methods of freezing and canning meat permit farmers far removed from the markets to supply consumer needs.

Sheep are amongst the oldest of domesticated animals. (See Fig. 8·11.) Originally native to west Asia, they have proved extremely adaptive and are now raised in both dry and humid lands. They feed on short grasses and herbs, and thus are ideal for short-grass prairies or steppes, for open woodland like sclerophyllous scrub, for high alpine pasture, or for cool temperate moors. These are the chief producing habitats. The drier, warmer areas favour merino sheep and a crop of wool; the damper, cooler areas favour meat production, with wool as a

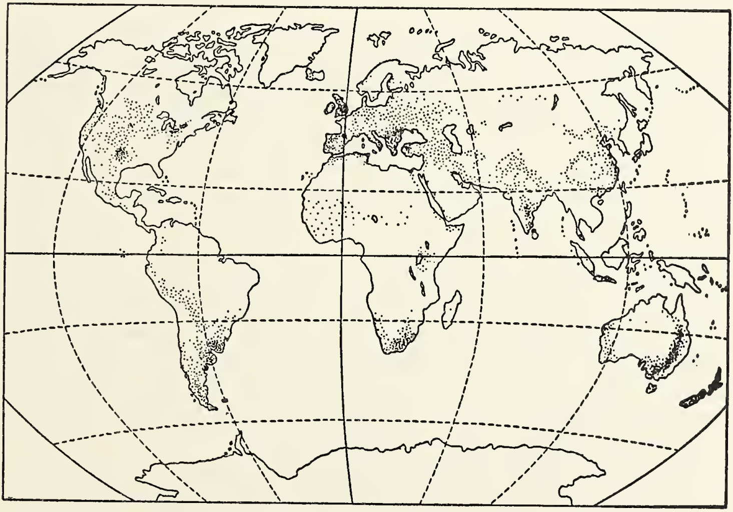

Fig. 8·11. World distribution of sheep production.

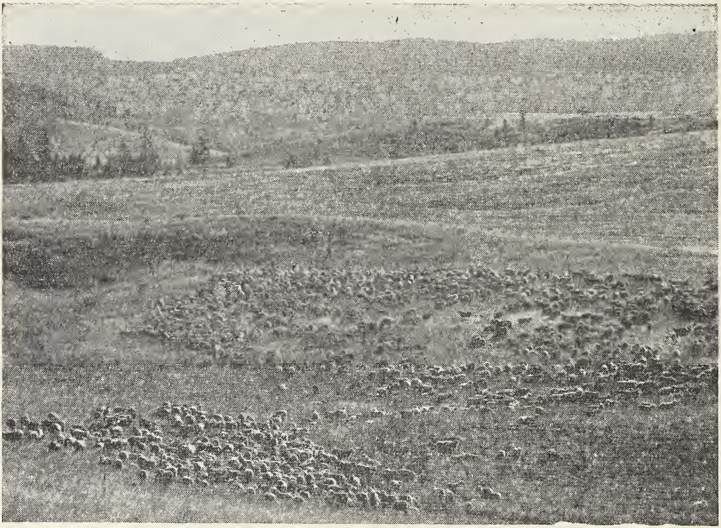

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Fig. 8·12. Sheep grazing on short grass prairie among rolling hills near Kamloops, British Columbia.

subsidiary product. The highlands of the United States and Canada, (See Fig. 8·12.) the moors and downs of western Europe, the hill pastures of the Mediterranean and western Asia, and the steppes of central Asia are the chief producing regions in the Northern Hemisphere. In the south, Argentina, South Africa, Australia, and New Zealand are notable.

Cattle like better grasses and tend, therefore, to be concentrated on the richer prairies or on sown pastures that have replaced deciduous forest in humid temperate lands. Animals dependent on forage crops are governed by the climatic requirements of such crops, which are really remarkably wide, except that areas of constant heat and rainfall are never favourable, nor are areas where winter killing occurs. But in a broad belt between the subtropics and the cool temperate lands, forage crops like corn, alfalfa, and oats supply an adequate basis for the cattle industry. Near to urbanized regions or where oats and hay are best grown, dairying tends to dominate. In remoter areas or regions where much corn is grown, beef cattle are raised.

In drier or subhumid regions where rainfall is less than 20 inches, forage crops are not successful unless irrigated, and cattle are raised on the natural range. (See Fig. 8·13.)

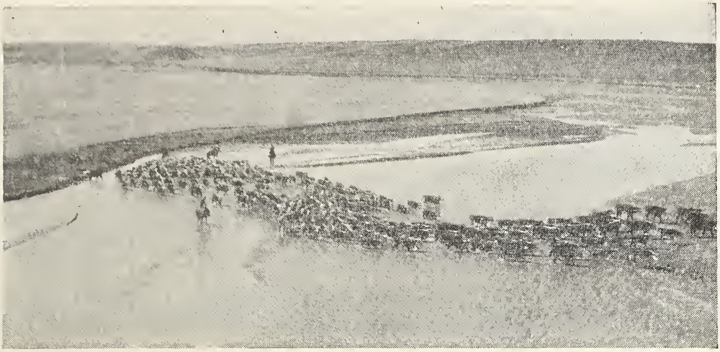

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Fig. 8·13. Cattle ranching in the prairies of Canada. Here the cattle are being driven across the Milk River in southern Alberta to their summer pasture.

The chief cattle-producing regions are western Canada and the St. Lawrence lowlands, the American west and mid-west (rangeland and corn belt), the humid pasture lands of western Europe, the steppes of southern Russia, the natural range of Argentina, South Africa, Australia, and New Zealand. (See Figs. 8·14 and 8·15.) Many cattle are raised

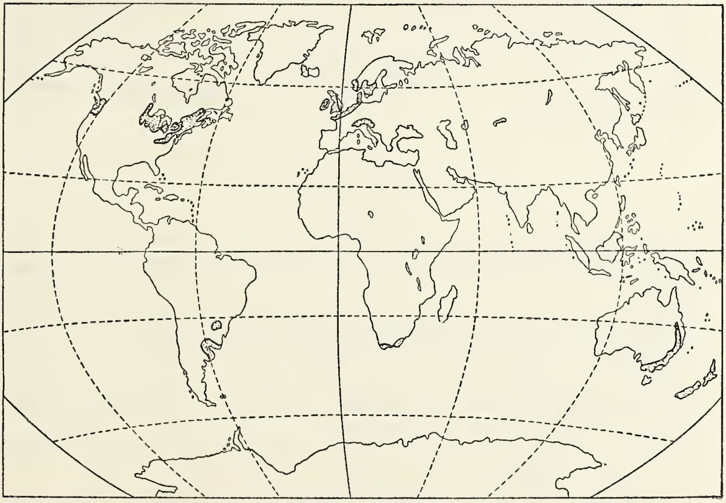

Fig. 8·14. World distribution of dairy cattle.

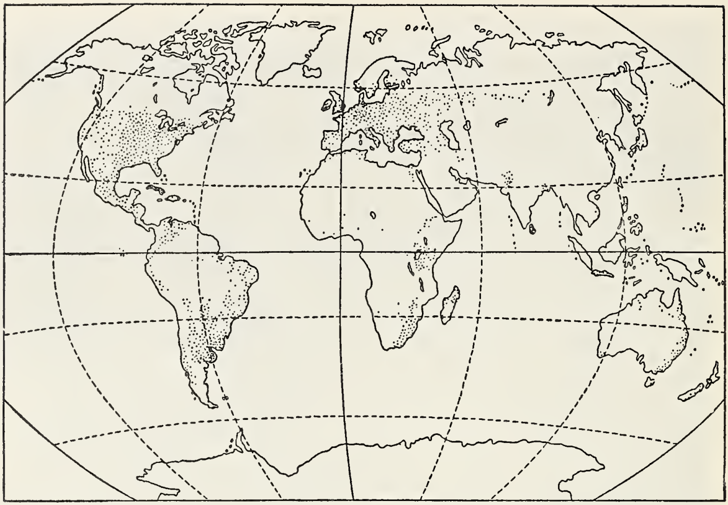

Fig. 8·15. World distribution of beef cattle production.

in India and on the plateau lands of East Africa, but they do not enter into world commerce. Cattle in the hot, wet regions of Africa have long suffered from disease due to the attacks of the tsetse fly, a native of the tropics. However, recent antidotes against the tsetse fly have been discovered and their use should help to increase cattle production in the tropical savannahs.

QUESTIONS

A-B

1. Which lands grow wheat and which grow rice? Is more of the world under one of these crops than the other? What countries grow both crops, and why?
2. List the optimum temperature conditions for rice, corn, wheat, oats, and rye. State the countries in which these are raised as principal crops.
3. What are the minimum and maximum rainfall conditions in which the following crops will grow: cotton, corn, wheat?
4. What are the main areas of production of the following crops: rubber, jute, millet, sugar-beet, citrus fruits, coffee?
5. Which countries of the world are the main producers of (a) wool, (b) beef, (c) butter? (See Figs. 8·11, 8·14, 8·15.)
6. Describe the features and vegetation in Fig. 8·13. Account for the change in vegetation.

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CHAPTER IX

Primary Production other than Agriculture

WORLD FISHERIES

Fishing is one of the oldest and most widespread of human occupations. (See Fig. 9·1.) Commercial fishing, however, concentrates on specific areas where conditions favour the maximum development of fish life. The geographical requirements are fairly definite. First the topography of the coast and the sea bed must be suitable. Very rocky, steep coasts, backed by cliffs, and fronting on deep water are not suited to commercial fishing. Neither are very even, gently sloping coasts, with no good harbours. Fjord and ria coasts are generally good, if the valley-heads lead back over easy routes to the interior. (See Fig. 9·2.) Drowned coasts, with extensive bays and estuaries are likewise favourable. Where the shore slopes out to a wide continental shelf, with an extensive area of shallow water, fishing is likely to be good. It is specially favoured where low banks lie on top of the continental shelf and afford the fish sites for eating and spawning. Salmon favour short rivers extending back to fresh water lakes for the best spawning grounds.

Temperate regions provide considerably better fishing areas than tropical waters. Although the warmer areas produce an amazing number of different species, the colder waters contain strains, such as herring and cod, that multiply by the millions and travel in great schools. Cool water, moreover, contains more of the plant foods than do equatorial areas.

The chief fisheries are in the Northern Hemisphere where the continental shelf is widest, as under the Newfoundland Banks, the North Sea of Europe, and the Sea of Japan. Here there is a stimulating mixture of cold currents from the north and warm ones from the south in relatively shallow water where plenty of plant food exists. (See Fig.

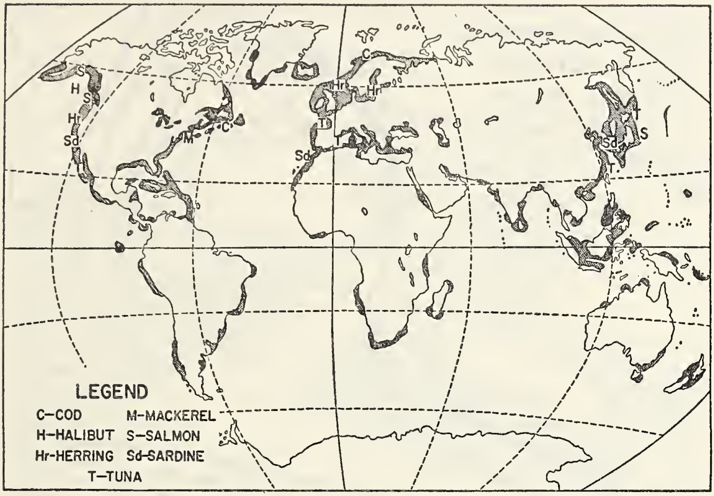

Fig. 9·1. World distribution of fisheries. The chief commercial ones are indicated by letters.

9·3, page 140.) Cod, haddock, herring, and sole are the principal catches. Also important are the salmon fisheries of British Columbia and the Maritimes, of Scotland and Norway, of northern Russia and Siberia.

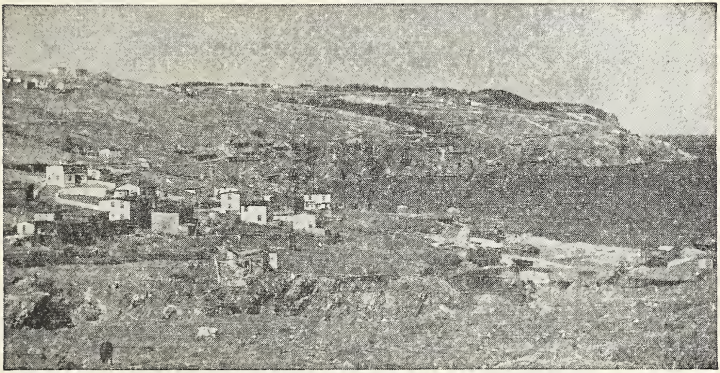

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Fig. 9·2. Typical fishing settlement on the ria coast of Newfoundland (Torbay). Since the land does not offer much in agriculture, settlement crowds to the coast. Note the numerous platforms for drying cod.

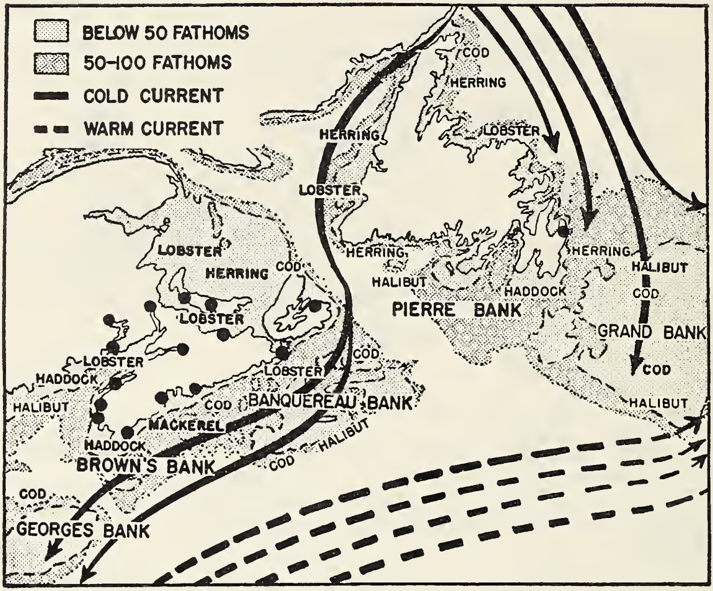


Fig. 9·3. Details of the most famous and productive fisheries of the world, those off Newfoundland and the Maritime Provinces. The mixture of currents in shallow seas over broad banks is ideal for fish life. The indented coasts are admirable for fishing communities.

FOREST OCCUPATIONS AND PRODUCTS

Fur. The fur trade, which with fishing, first helped to open up Canada to the French and the British, depends largely on fur-bearing animals of the forest. Some savannah types of fur, like tiger skins, or tundra varieties, like seal-skin and white fox, are significant, but the bulk of the furs comes from the temperate forests. Today, these are mainly the coniferous forests, since the deciduous woodlands have given place to agriculture. In the vast domain of the spruce and the pine, live many fur-bearing animals, including mink, marten, squirrel, the silver fox and the red fox, muskrat, beaver, and rabbit. These are trapped throughout Alaska, northern Canada, northern Russia and Siberia, the main fur-producing regions. There are, however, many fur farms where these animals are reared in captivity, and, of course, these farms can be set up in settled areas outside the limits of the forest. Increasing competition is also being felt from the sale of kid and lamb skins from Persia and China, where large flocks of sheep and goats are herded among the hills. Competition is also coming from artificial furs made of nylon.

Lumber. One of the principal products of the forest is lumber for construction purposes. Different types of lumber are derived from different climatic areas. (See Fig. 9·4.) Tropical hardwoods, like mahogany, greenheart, ebony, sal, sandal, and teak wood, come from equatorial selvas and monsoon forests. They need a perennial growing season, with constant heat and abundant moisture, in which to develop. They are obtained from the humid coasts of Central America, from the Guiana and Amazonian forests, from India, Burma, and the East Indies. Though tropical forests are large, their timber production is not high because of the difficulties involved. The desired trees are often scattered and seldom grow in large, pure stands; they are found in inaccessible places away from railway or road; they occur in disease-ridden areas; they are very heavy and difficult to handle. In Burma, elephants are used to drag the heavy logs of teak out of the forest to the river banks, where they are rafted down to the mills. Nevertheless the great demand for these very dense, hard, fine-grained woods makes all the hazards worthwhile.

Temperate forests have the advantage of being nearer to the main consuming markets—the huge industrial cities of the temperate lands—

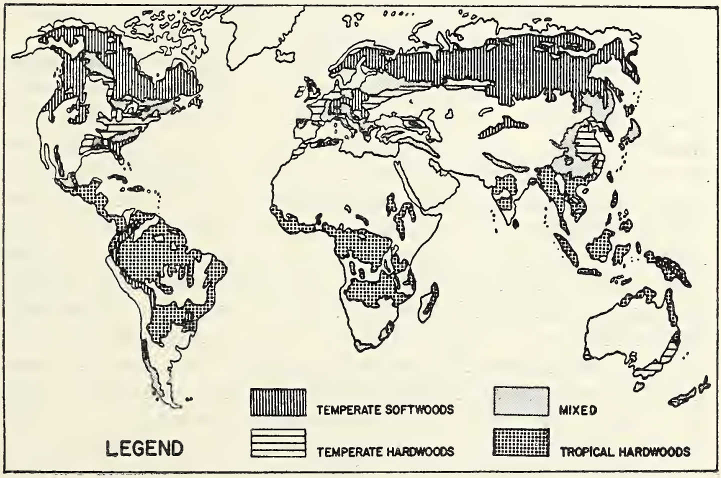


Fig. 9·4. World distribution of forests.

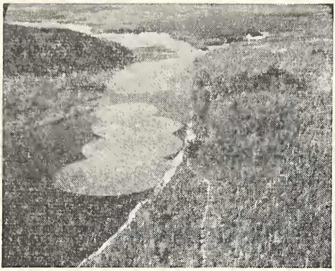
and they also consist of trees which grow in pure stands over wide areas. Thus the same type of tree can be cut, mile after mile, with the use of the same road in and out, by the same work gang, and with the same machinery. Large-scale methods of cutting, trimming, logging, and hauling can be followed, which greatly reduce overhead and increase efficiency. Dangers do exist in this. Wasteful and exploitive cutting may exhaust the forest. But if proper conservation methods are followed, sufficient new growth will spring up to replace what is cut down.

British people are described in song as having "hearts of oak". Commerce in oak was once widely developed in western Europe. Other temperate hardwoods are ash for tools, maple and birch for flooring and furniture, walnut for fine cabinets, and beechwood for chairs. These hardwoods are found in humid areas with a comparatively long growing season, as in western Europe, eastern Canada and the United States, Manchuria and northern Japan, Chile and Australia. In Australia, very hard woods, called **jarrah** and **karri,** are in wide demand for use as harbour piles all over the world.

Softwood lumber for building houses, small bridges, barns, and sheds has an even wider sale than the temperate hardwoods. It is derived from cedar, fir, pine, and hemlock. These have their distribution in the west marine climate of the American north-west and British Columbia and in the boreal forests of Alaska and northern Canada, Scandinavia, northern Russia and Siberia, and the mountains of Manchuria, Korea, and Japan. They also occur in the higher mountains of Europe. In the Southern Hemisphere, they are found on the Chilean slopes of the Andes.

Pulp, Paper, Cellulose and Rayon. Modern industry makes enormous demands on paper for filters, all kinds of wrapping and packaging, wallboard, and so forth. In addition, modern life finds increasing uses for paper—wallpaper, paper towels and napkins, disposers, containers, newspapers and magazines, maps and books. Consequently, there has been a vast growth in the pulp and paper industry in the last fifty years.

Pulp and paper are obtained chiefly from medium-sized to small conifers such as spruce, and from softwood deciduous trees like basswood. Great forests of these trees are found in subarctic Canada, Scandinavia, Russia, and Siberia. They occur in lands of winter snow and summer rain, of large, full rivers, of glaciated countryside full of lakes and waterfalls—lands unsuited to agriculture but ideal for forests. Here the trees are cut in winter; the logs are hauled out easily on the snowy surface; it is not far to a lake or a river; they are piled up till the thaw comes; then they are floated down the foaming streams to the sawmills at strategic centres. (See Fig. 9·5.) In some parts of Canada, however, modern machinery has made year-round logging



National Film Board

Fig. 9·5. Logs floating down the Gatineau River to the mill in the distance.

operations possible, and the industry can thus meet the heavy demand for pulpwood. Frequent power sites provide hydro electricity for running mills. Thus pulp or paper can be made relatively cheaply. Canada is the world's chief producer and dominates world trade in these products. It is followed by Scandinavia and the U.S.S.R. The United States of America at one time had considerable reserves of suitable softwood although these have been sadly depleted. Only by careful conservation will our forest resources be preserved for our future well-being.

The production of cellulose for the film industry, of wood alcohol for industrial chemistry, and of rayon for the textile industry is also important in Canada and Scandinavia.

Rubber may be considered either as a forest product or as an industrial crop. (See Fig. 9·6.) In Brazil, where the extraction of rubber began, it is still sometimes a product of the wild woods; in south-east Asia, it is a

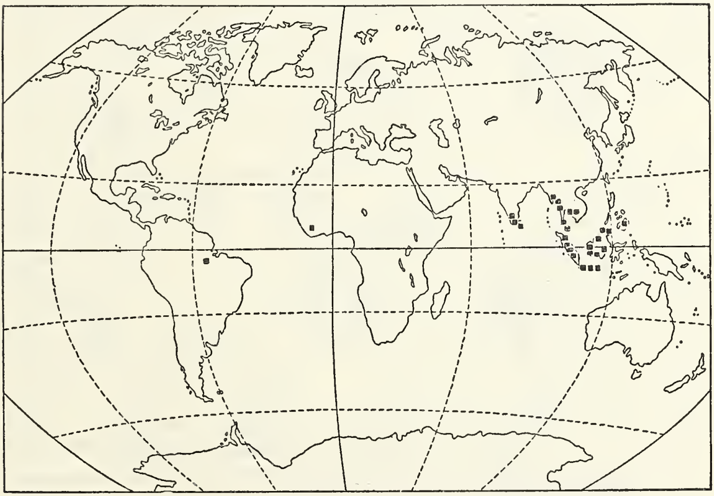


Fig. 9·6. World distribution of rubber production.

plantation crop. Rubber is made by the hardening of a milky latex that exudes from beneath the bark of the rubber tree, once the bark is cut. The natives of Brazil work on commission and go through the forest searching out and tapping the trees. They harden the rubber over flames into large balls that are taken down river to the coastal ports for trade in the world market.

This is an inefficient method of collecting rubber, and the British and the Dutch transplanted rubber trees from Brazil to Ceylon, Malaya, and Indonesia and started the flourishing system of plantation culture. This gives a steadier, better-regulated, more efficient method of production, and these countries have now cornered the rubber market. American enterprise has established recent plantations in Liberia.

Plantation rubber is being challenged by the excellent artificial rubber which is now produced in the industrial consuming centres and which does not require both a specific climate and a large labour force.

MINERAL, FUEL, AND POWER PRODUCTION

Fuels. The distribution of minerals and fuels is determined by the geology and structure of the continents. The great shield areas, floored by crystalline or metamorphic rocks, are rich in metals, but lack coal or oil except in enclaves of sedimentary rocks. (See Fig. 9·7.) The

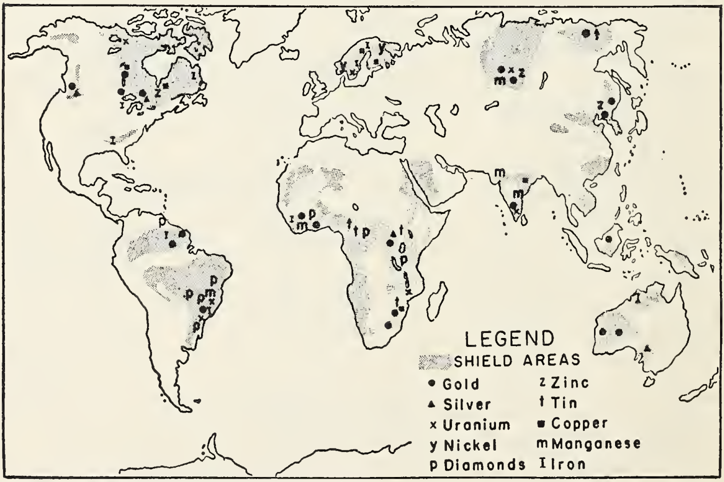


Fig. 9·7. The distribution of minerals in relation to shield areas, or old mountain forelands. (After Van Royen and Bowles.)

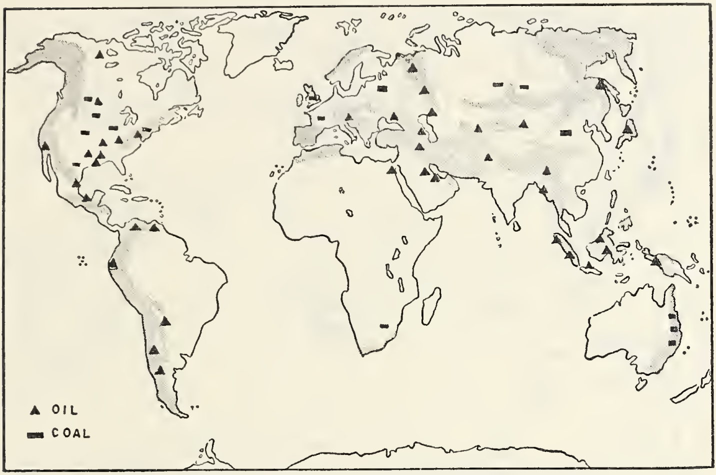


Fig. 9·8. The fuels of the world, chiefly coal and oil, are closely related to the distribution of fold mountains.

interior lowlands, where shallow seas and lagoons once caused the accumulation of dense masses of swamp vegetation, are the sites of the principal **oil-** and **coal-**fields, embedded in sedimentary formations. (See Fig. 9·8.) The marginal mountains, consisting both of folded sedimentaries and intruded crystallines, have frequent deposits of coal or oil in their valleys, and veins or lodes of ore in their igneous cores.

Radio-active Ores. These are associated chiefly with occurrences of pitchblende included in or on the edges of shield areas. They include **radium** and **uranium.** The latter metal is used in the production of atomic energy because the uranium atom splits more easily than that of other substances. Large uranium deposits are found in north-west Canada, at Great Bear Lake and Lake Athabaska; in northern Ontario; in the Belgian Congo; and in central Siberia. Deposits are also reported from northern Australia. **Vanadium,** for making alloy steel, is often found with uranium.

Precious Metals. (See Fig. 9·9, page 146.) GOLD occurs either in veins or placer deposits. Veins develop around igneous intrusions and are mined chiefly in shield regions, as in the Transvaal, South Africa; in the mines of north-west Quebec and northern Ontario, and those of the Great Slave Lake; the ores of western Australia; and some of the ores of Russia and Siberia. Much gold is found in the form of fragments or nuggets washed

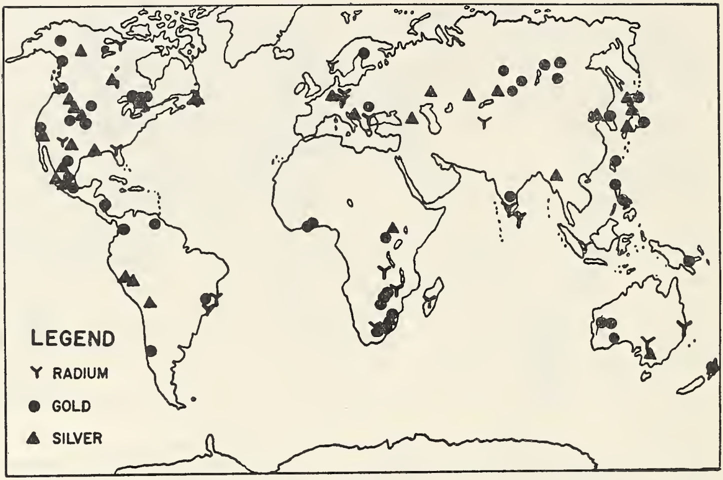
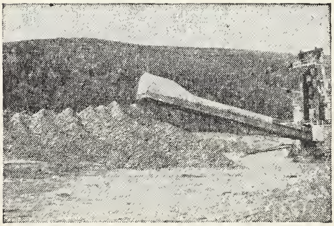


Fig. 9·9. World distribution of precious metals.

out of veins, especially in mountain areas where erosion takes place, and deposited in valley gravels. This **placer gold** is mined in the Yukon (See Fig. 9·10.) and California, in the Ural Mountains of Russia, and along the Amur in Siberia.

SILVER, which occurs mainly in veins in igneous rocks, is also found in shield areas or in the crystalline cores of intensively folded mountains. Although some is associated with gold, most of it is mixed with lead and zinc or cobalt. In Northern Ontario, the veins are linked with cobalt; in British Columbia and the Yukon, with lead and zinc. The mountain states of the United States, the plateau and mountains of Mexico, and the mountains of Peru are the world's chief producing centres.

PLATINUM exists either in basic igneous rocks, often along with nickel and copper, or in placer gravels and alluvium. In Canada, most of it comes from the Sudbury nickel area, but some is derived from placers in British Columbia. Canada is the world's chief producer, along with the United States and South Africa,



Department of Mines and Technical Surveys

Fig. 9·10. Dredging for placer gold in the gravels of Bonanza Creek, Yukon.

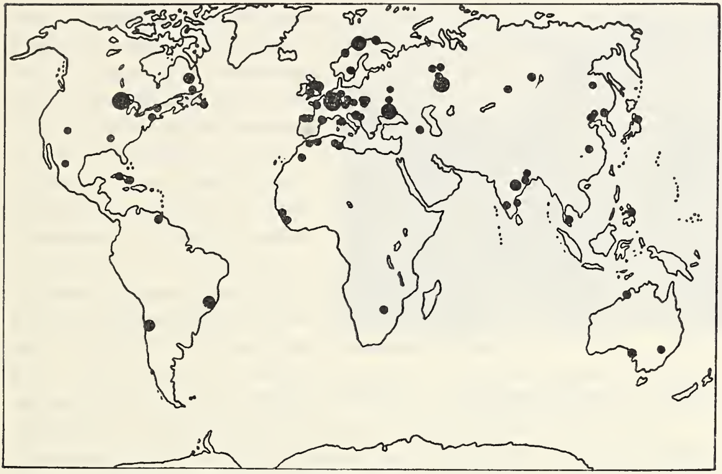


Fig. 9·11. World distribution of iron ore. (After Van Royen and Bowles.)

Iron and Iron Alloys. Iron is one of the commonest metals of the earth's crust, but to be worked commercially, it must occur in concentrated form, usually where more than 40 per cent of the ore is iron. (See Fig. 9·11.) Large deposits of grade ore are limited in their distribution. Different types of ore have their particular geography. Some are **magmatic segregations.** When the magma or liquid basal rock comes towards the surface in shields or mountains, it cools and an ore body may segregate out from it, at its margins. Iron thus formed is usually associated with titanium and is used in making titanium-steel. It is found in east central Quebec. Other iron ores are **contact-metamorphic deposits.** They form at the contact surface between igneous intrusions and the sedimentary rocks around that become metamorphosed. Magnetitic iron, such as occurs in Vancouver Island, is commonly the result. Many iron ores are **bedded sedimentary deposits.** The iron is carried in solution by streams and laid down in beds between mud and sand. In most cases, the iron lumps together in small concretions, called **oolites** because they look like the roe of fish. These are the chief iron ores of the world and are found in the huge ranges around the edge of the Canadian Shield, in Minnesota, and Northern Ontario, and are interbedded with oolitic limestones in England, Belgium, Luxembourg, and France. Similar ores occur at Wabana, Newfoundland, and in Alabama. Finally, **banded iron formations** are found in certain

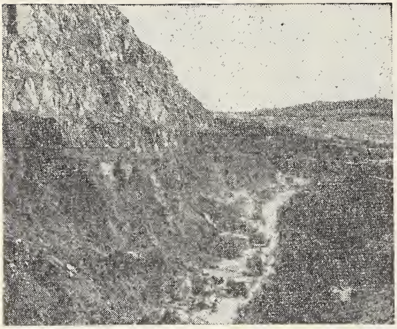


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Fig. 9·12. Mining iron by the open pit method at Steep Rock, Ontario. Note use of heavy mechanical equipment.

precambrian regions, where there is a banding of silica and **haematite**, silica and siderite, silica and **iron silicate.** Such are ore bodies on the eastern Canadian Shield, in the Brazilian Shield, and in shield areas in Scandinavia, South Africa, India, and Australia.

The United States and western Europe have long been the chief iron-producing regions of the world. However, both Canada and Brazil are thought to have large reserves. (See Fig. 9·12.) Southern Russia, Cuba, northern Africa, and India are fairly important, followed by South Africa and Australia. The concentration of ore bodies round the Atlantic is striking.

Chromium, manganese, molybdenum, titanium, tungsten, and vanadium are used in alloy with iron to make high grades of steel. (See Fig. 9·13.) Chromium comes from chromite, associated with basic

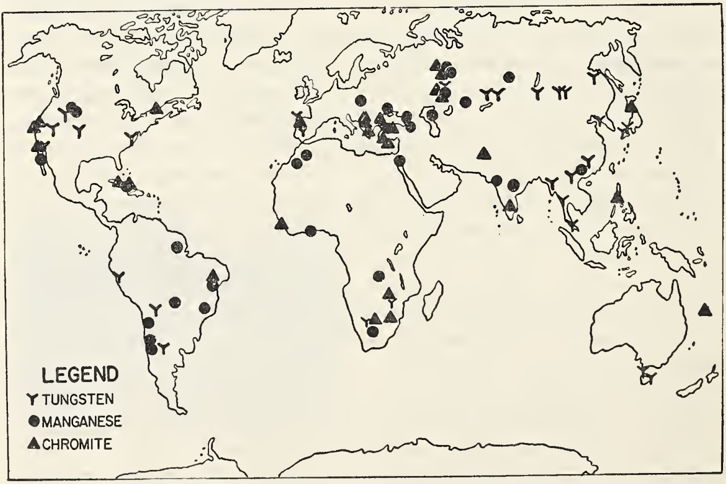


Fig. 9·13. World distribution of ferro-alloy ores. (After Van Royen and Bowles.)

igneous rocks and magmatic segregations; manganese, on the other hand, occurs in sedimentary rocks, as beds or lenses; molybdenum is found in veins along the contact between igneous and metamorphic rocks; titanium commonly occurs as a magmatic segregation in shield areas; tungsten is usually associated with quartz veins or is found in placer deposits; vanadium generally occurs with uranium.

The chief producers of chromium are Russia, Turkey, and Rhodesia; of manganese, Russia and India; of molybdenum, the United States, Mexico, and Norway; titanium, Canada; tungsten, China, Burma, the United States; and vanadium, south-west Africa and northern Rhodesia.

Nickel, Copper, Lead and Zinc. (See Fig. 9·14.) NICKEL is one of the most important ores for modern industry. It is used to harden steel and to make a weather-proof or stainless plating for metal goods. Supposed to be the material of which the earth's core is made, it rarely appears at the surface. Where it does so, it pushes up in a few huge structures, usually along the contact between granite and norite. Of these, the largest in the world is at Sudbury, Ontario. Other large deposits exist in northern Manitoba and Keewatin. Smaller nickel structures are found in Norway, north-west Russia, and in New Caledonia.

COPPER is associated with nickel at Sudbury, with gold in Quebec and northern Manitoba, and with gold and silver in British Columbia. The

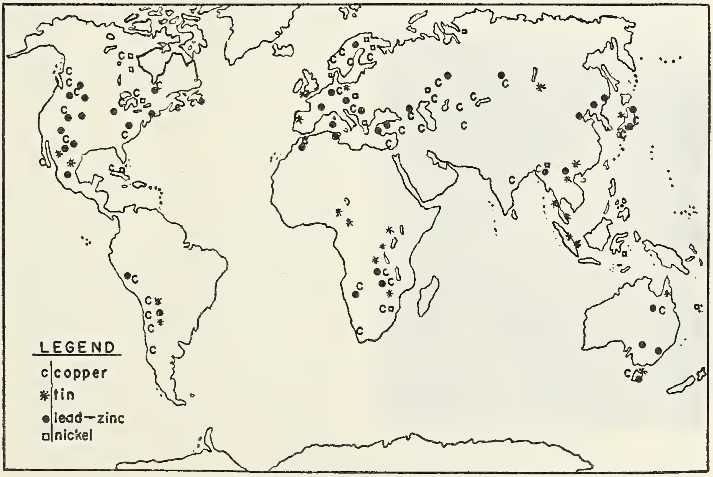
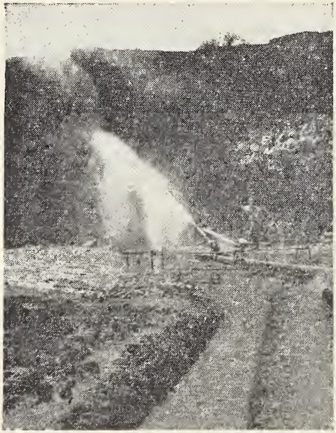


Fig. 9·14. World distribution of important industrial metals. (After Van Royen and Bowles.)

main occurrences are in the form of magmatic segregations (Sudbury) and contact metamorphic deposits (Quebec, British Columbia), in or around shield areas or on the margins of igneous cores in fold mountains. Copper forms compounds with other metals very freely and is not often found in its native state. About the only large native occurrence is at depth in igneous rocks in Michigan. The United States, Chile, Canada, and Rhodesia are the world's chief producers.

LEAD and ZINC are generally found together. Neither of them occurs in the native state to any extent; both exist mainly as sulphides or carbonates. Galena is the ore from which lead is extracted; sphalerite, that from which zinc is purified. These ores occur in two ways, either as originally hot solutions escaping from igneous magmas or as solutions in ground water, often rising up under anticlines in folded mountains. The first type is found in shield areas or giant batholiths, along with gold and silver; the second, in folded sedimentaries. In Canada, zinc and lead are found mainly in the mountainous areas of the Yukon and British Columbia. The world's chief producers are the United States, Canada, Mexico, and Australia.

TIN AND ALUMINUM, two important metals of modern industry, are found chiefly in tropical or subtropical lands. Tin is used for plating; aluminum, for light machinery and construction. South-east Asia, central Africa, and Bolivia supply the world with most of its tin. In Malaya, the tin is an alluvial deposit and is easily mined by playing powerful jets of water on the crumbling banks and washing the material into sluice boxes, from which it is concentrated. (See Fig. 9·15.) In Bolivia, it occurs as veins in the rock of the Andean mountains. Similar veins exist in Nigeria and the Belgian Congo. The tin concentrates are shipped to England and Belgium to be refined into tin. Britain, which has tin mines in Cornwall, has perhaps the oldest tin industry in the world, having been noted for it in the days of the Roman Empire.



British Information Service

Fig. 9·15. Mining tin in Malaya by hosing the soft, crumbling ore from banks exposed in valleys.

Bauxite is the ore from which aluminum is derived. This is found in quantity in southern Europe, Arkansas, Jamaica, British Honduras,

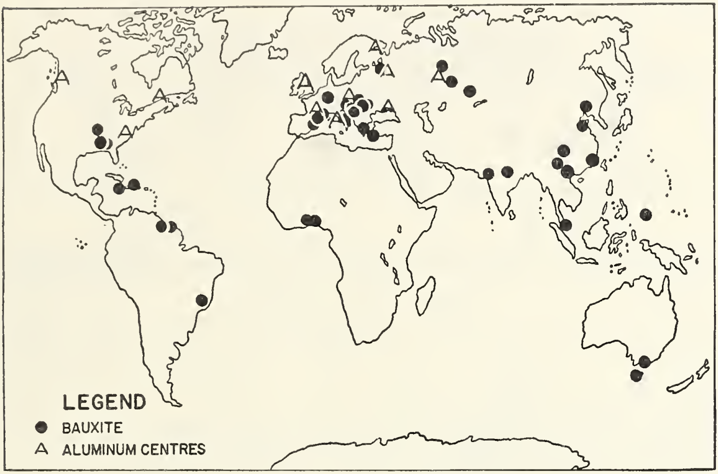


Fig. 9·16. World distribution of bauxite and of the manufacture of aluminum. (After Van Royen and Bowles.)

and British and Dutch Guiana. The bauxite contains about 40 per cent aluminum. It is first reduced to alumina, an oxide of aluminum. Refining aluminum from alumina requires an immense amount of hydro electricity. Hence, aluminum is often refined in places that are quite remote from the sources of the ore. North-west United States, British Columbia, Quebec, Scotland, and Norway, with large quantities of cheap electricity, are important smelting centres. (See Fig. 9·16.)

Coal transformed the modern world after Watt invented the steam engine. Steam, raised in great quantity by the use of coal, drove all kinds of the most powerful machinery. It still does, although oil and gasoline-driven engines now compete. Nevertheless, so much modern industry is geared to coal that for a very long time to come the great industrial areas of the world will lie on its coal-fields.

Coal is a carbonaceous rock developed from the consolidation of vegetation in bygone swamps. These swamps first became choked with vegetation (cycads, tree ferns, reeds, and rushes) and then were filled in and buried over by river-borne or wind-blown sediments. The carbon in the plants eventually hardened into coal.

Coal-fields, therefore, depend on the geographical location of these ancient swamps. Most of them occurred in shallow seas in the temperate zone in the coastal or interior lowlands of the continents. Little coal is

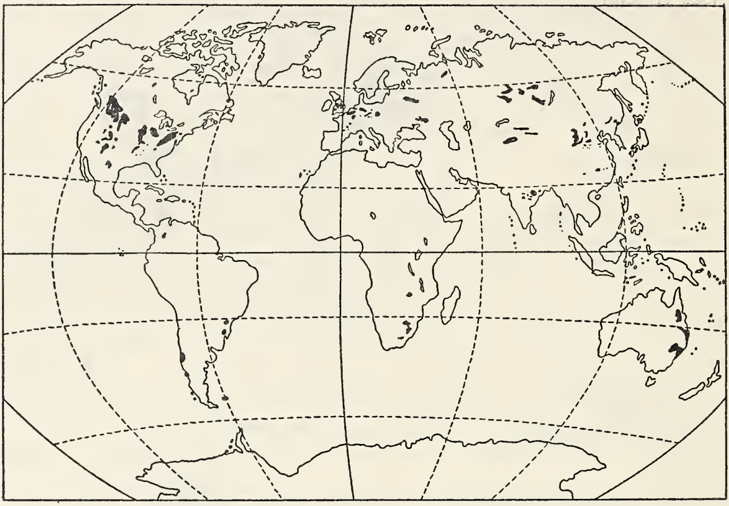


Fig. 9·17. World distribution of coal. (After Van Royen and Bowles.)

found in the tropics. Some is found as far north as Spitzbergen and the Canadian Arctic, where temperate climates once extended or where large peat bogs existed that later became pressed into coal.

The coal-rich regions of the world (See Fig. 9·17.) are northern central and north-eastern United States, Alberta and the Maritimes in Canada, the midlands of Scotland and northern England, north-east France and southern Belgium, western Germany, southern Poland, the Ukraine, several basins in southern Siberia, southern Manchuria, north China and northern Japan, northern India, Natal in South Africa, and New South Wales in Australia. Certain of these regions, like Alberta, southern Siberia, and north China, are not so fully developed as they might be because of their relative inaccessibility to the main manufacturing regions and the chief markets of their continents. Since coal is very bulky, transportation is a vital factor in its use. The most highly developed coal-fields are those on the sea coast or by great lakes and rivers, where water transportation (the cheapest kind) is available or where the chief trading cities have grown up. So far, the nations with an ample supply of coal, like the United States, Britain, Germany, and the U.S.S.R., have been the ones to forge ahead as the great industrial powers of our times.

Oil has become important in the last sixty years, since the invention of the internal combustion engine and the advent of the automobile and

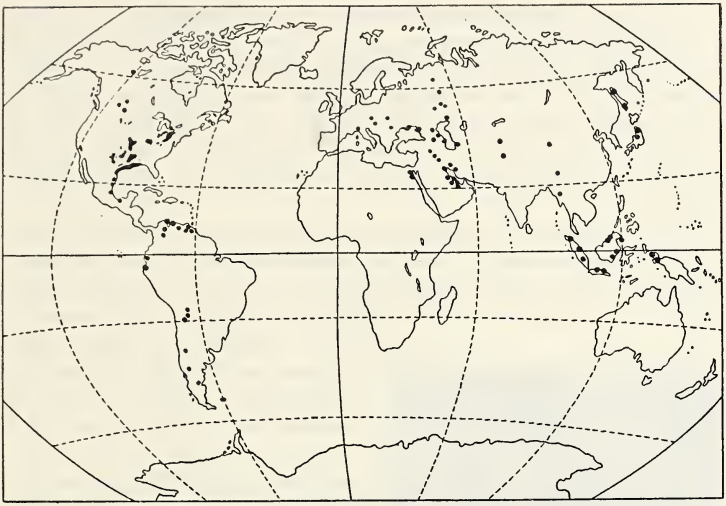


Fig. 9·18. World distribution of oil. (After Van Royen and Bowles.)

of the aeroplane. Fuel oil is now used for Diesel-engined trains, interstate and interprovincial truck transport, and also for ocean liners. Most of the world's naval fleets run on oil, not coal. Great quantities of oil are used to lubricate machinery of every kind.

Oil is said to be derived from long-dead remains of minute forms of animal and plant life crushed by the weight of sediments that have gradually accumulated on top of them. Oil is, therefore, linked with sedimentary rocks and is not found in the shield areas of the earth. Oil collects in large pools that can be commercially developed only under certain rather special conditions. It is found in porous rocks between impermeable layers; otherwise it would escape. It usually occurs in gently folded areas where the anticline or oil dome traps the oil and at the same time brings it towards the surface. If a region has been intensely folded and faulted, however, little or no oil exists because it drains off through breaks in the rocks.

Because of these structural controls, oil is found on the flanks or in the foothills of the younger ranges of mountains. (See Fig. 9·18.) Thus it occurs along the flanks of the Rockies and of the Andes, of the Carpathians and the Caucasus, of the Himalayas and of their extension down through the East Indies, and of the mountains of the island fringe off eastern Asia.

Oil generally lies as a zone between a layer of natural gas at the top of the dome and a layer of water at the bottom. If the well is dug down on the side of the anticline, so as to miss the gas layer above and the water layer below and to strike only the zone of oil, then the oil is forced up easily and economically to the surface by the pressure of the gas. Frequently, however, it is equally as valuable to tap the gas as to strike oil. When the gas is drawn off, oil has to be pumped to the surface.

North America probably has more oil than the rest of the world put together. Huge reserves lie in the tar sands of Alberta; liquid petroleum is found in other Alberta areas (See Fig. 9·19.) and in southern Saskatchewan and Manitoba, while large fields exist in Texas, Oklahoma, and in California and smaller ones in the eastern interior states and the Appalachians. Oil also occurs in Rumania and on the flanks of the Caucasus in Russia; very large fields are found in Iran, Iraq, and on the Arabian shores of the Persian Gulf; some lie in inland Burma; considerable quantities are found in Indonesia and Borneo. Mexico is a principal producer, as also is Venezuela. Colombia, Peru, and Argentina have small fields. There is almost no oil in western Europe, Africa, or Australia.

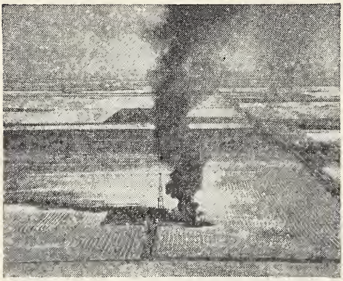


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Fig. 9·19. A new well coming in at the Calmar oil field near Edmonton, Alta. Oil has become a principal new source of wealth, even eclipsing farming in this region.

The crude oil is piped or taken by tanker to the refineries, most of which are built in the heavily industrialized parts of the world—north-eastern North America, western Europe and Japan—where the greatest demand for fuel and lubricating oil and for gasoline exists. Here the oil is broken up into different components and distributed as and where it is needed.

Water Power is the oldest and most widespread of the forces used to drive machinery for man. Before the advent of coal and oil, the larger industries had to be located at or near waterfalls. Thus the woollen and iron industries of Britain were up among the hills where, actually, it was sometimes difficult to get at them. In North America, mills were set up on the St. Lawrence, at numerous falls and rapids, or along the "fall line" in the United States, where the rivers left the Appalachians over a series of waterfalls.

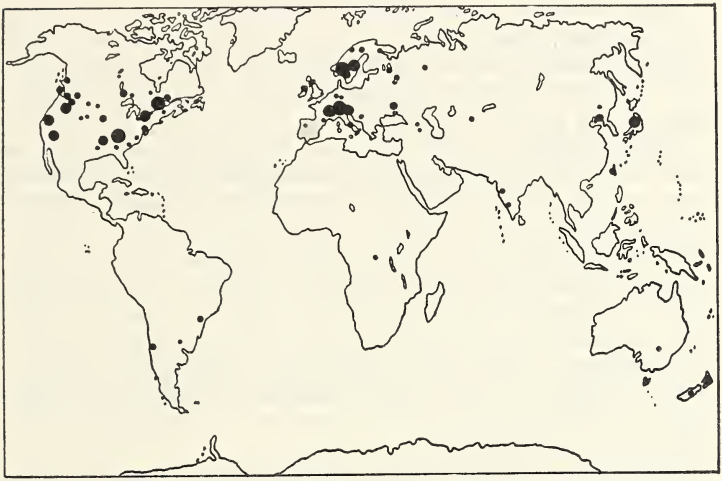

Fig. 9·20. World distribution of principal hydro-electric works. (After Van Royen and Bowles.)

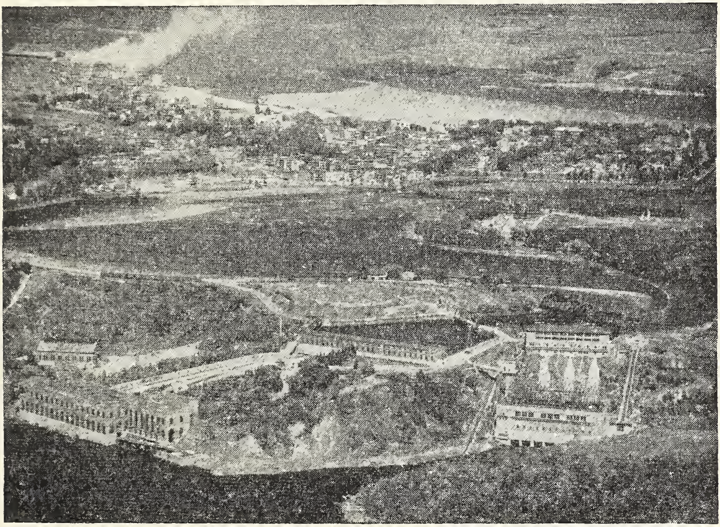

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Fig. 9·21. The hydro-electric dam and power plant at Shawinigan Falls, centre of pulp and paper and aluminum production.

Water power lost out to coal in the nineteenth century, and British and American industry moved to the coal-fields. Canadian industry moved to where it was easy to assemble coal. With the discovery of hydro electricity, however, water came back into its own as a source of power. (See Fig. 9·20, page 155.)

Hydro Electricity is widely used in all humid lands where there are long, full rivers with a permanent flow of water. In the equatorial, monsoon and temperate humid climates, there is usually abundant water and these are the chief sites of hydro-electric power. Countries, like Canada, that have high, snow-capped mountains or broad glaciated plateaux, pitted with lakes are especially favoured by their possibilities of hydro-electric development. (See Fig. 9·21, page 155.) Here there is an ample supply of water and it drops down steep slopes to the bordering lowlands, thus developing a considerable "head" of power. Canada, the United States, Scandinavia, Russia, and the Alpine countries of Europe are the chief producers of hydro-electric power, along with India and Brazil.

Due either to climate or to their geological mode of occurrence, then, all natural resources have a limited and definite geographical distribution. This profoundly influences the geographical distribution of man and of his activities.

QUESTIONS

A

1. Which continents are well-supplied with coal, and which are poorly-supplied with coal?

B

2. What geographical conditions give rise to commercial fisheries, and where are these conditions best met? (See Fig. 9·3.)
3. What countries or regions of the world are principal producers of teak, cedar, jarrah, mahogany, sandal-wood, fir, oak, pine, ebony, hemlock? (See Fig. 9·4.)
4. Name and account for the chief pulp- and paper-producing regions of the world.
5. List the main Shield areas of the world. State for each one the principal minerals it produces.
6. Compare and contrast the factors of structure influencing the world distribution of iron and oil. (Figs. 9·11, 9·8.)
7. Why are the main centres of bauxite and aluminum production so frequently far removed from each other? What are ideal conditions for the making of aluminum? (See Fig. 9·16.)
8. What are the main areas of hydro-electric development? Explain their distribution.

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CHAPTER X

The Geography of Manufacturing

THE REQUIREMENTS OF INDUSTRY

Geographical Factors. Modern industry has changed the geography of the world more rapidly than anything else has. It has provided the tools for a much more extensive development of mining, agriculture, lumbering, and fishing. It has improved transportation and communication immeasurably. It has helped trade by increasing productivity, facilitating the flow of goods, and enlarging world markets. It has stimulated the growth of world population by providing many more occupations and much more work than was ever known. It has led, in particular, to the spread of huge cities and of groups of cities and to the rise of definite industrial areas on the earth. In these there is a tremendous concentration of people, activity, power, and wealth. These areas have become the nerve centres of modern life. (See Fig. 10·1.)

While industry has forged a new geography—a new distribution of man and his works—it should never be forgotten that geography has helped to make industry. The geographical factor is absolutely vital to the establishment and expansion of industry.

Indeed, the first question that is asked when a new venture is about to be started is a geographical one: "Where should it be placed?" The answer will be different for each kind of industry, for different stages of economic organization, and for each society. Thus it will be different for a steel mill as compared with a textile plant, for a factory at the mass-production stage as compared with a work-shop at the domestic stage of industrial development, and for a society that stresses labour-saving machines as compared with one that depends largely on animal or human effort.

Raw Materials and Markets. There are, however, certain general functions provided by every industry. Consequently, every industry has certain geographical requirements to meet. The basic function of

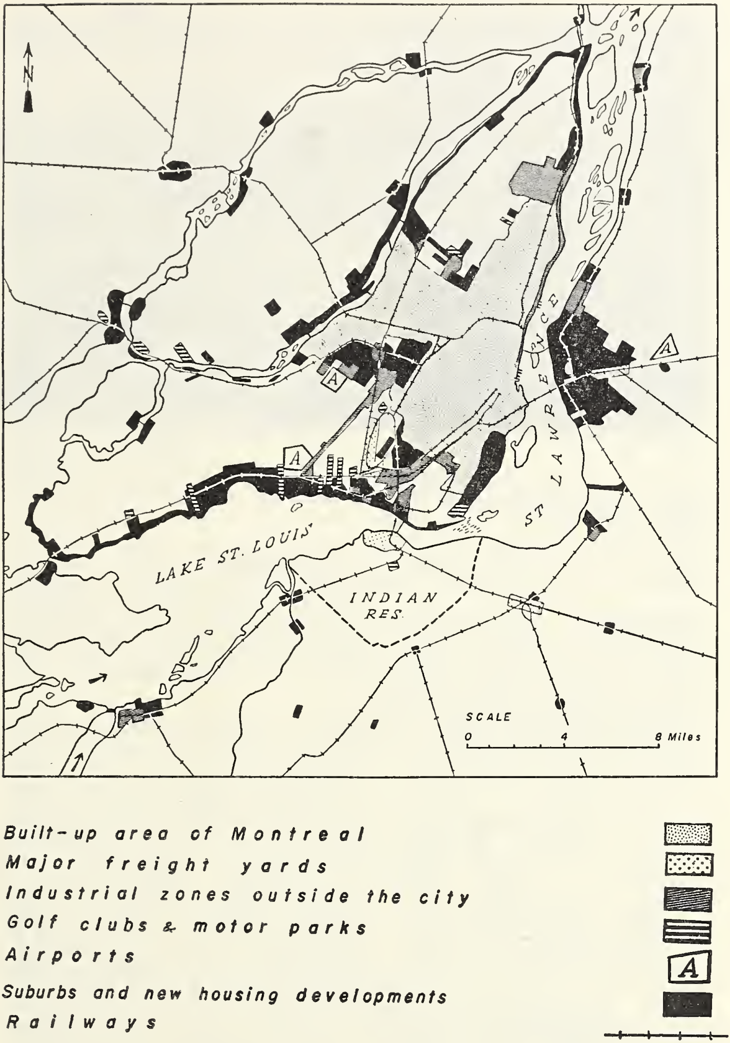
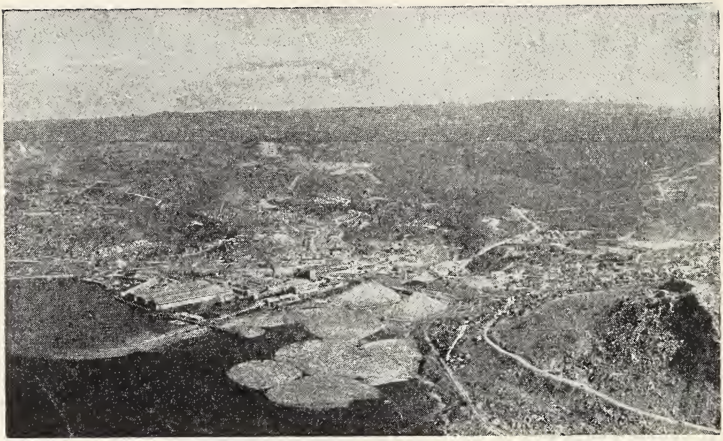


Fig. 10·1. Montreal graphically illustrates the changes wrought by the impact of a large city on the surrounding country. A centre of Canadian trade and transportation, sea, air, and land, it shows a tremendous concentration of people, activity, power and wealth. (After Pierre Camu.)



Canadian Pacific Airways

Fig. 10·2. Bowaters at Cornerbrook, Newfoundland, is an example of an industry close to its raw material. The famous pulp and paper plant commands an extensive region of coniferous forest.

ndustry is to take raw materials and manufacture them into semi-finished or finished products. Therefore it must consider its access to raw materials. (See Fig. 10·2.) It manufactures the end product on behalf of the consumer. (The consumer needs the product. but does not have the time, means, or skill to produce it himself.) So access to the consumer market is also important.

Power, Fuel, and Water. Changing raw matter to consumer goods requires a great deal of power. The machinery involved in the transforming process is usually driven by steam, gasoline, oil, or hydro-electricity. Nearness to sources of fuel and power is, as a result, often to be desired. (See Fig. 10·3.) In many industries, moreover, great quantities of water are needed for raising steam, for washing and cleaning, for cooling, for making solutions of matter, or for humidifying the factory atmosphere. A good supply of water is frequently a necessity.

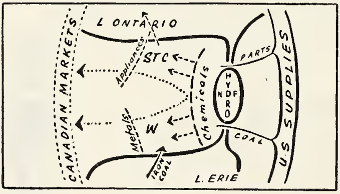
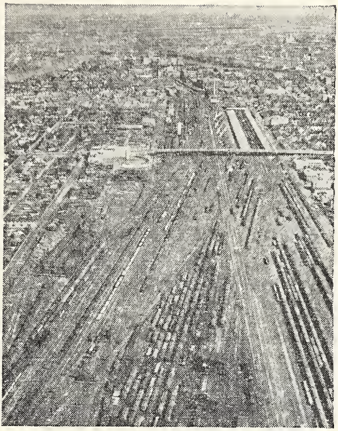


Fig. 10·3. Concentration of power-using industries at or near water power and hydro-electricity in the Niagara frontier, Ontario. N.F., electro-chemical industries at Niagara Falls; W, electro-metallurgical industries at Welland; St. C., electrical appliances at St. Catharines.

Labour. Raw materials can be made into finished articles only by the application of labour. Thus industry tends to grow up in areas where there are many people, with many skills, seeking work.

Transportation. In bringing raw materials together, sending out the manufactured products, assembling coal and oil, and getting the people to their work, transportation is vital. (See Fig. 10·4.) Different industries seek their own type. Those using heavy and bulky matter or making heavy goods prefer water transportation; those making light goods or highly concentrated preparations may afford air transportation. Rail and road serve most general purposes.



National Film Board

Fig. 10·4. Winnipeg owes its importance largely to its command of water, road, and rail. One of the great railway junctions of the continent, its railway yards and stock pens take up a huge part of the city.

Local Site. Finally, the success of an industry may depend on the local site. Large plants using mass-production methods must have flat, open land on which to build. (See Fig. 10·5, page 162.) Plants using water power may prefer a steep, valley site, where a mill dam can easily be thrown across the stream. Some products are best prepared in a humid climate; other businesses, like the film industry, prefer a dry one.

Thus, when the question "Where should an industry be placed?" arises, many factors must be taken into account in arriving at the answer. Should the factory be situated at the source of its raw materials? Then it might be too far from its markets. Should it be placed at the heart of the market area? Then it might have to pay too much to bring in its basic supplies. Ought it to be situated where power is cheapest and most plentiful? Which is the cheaper, to bring the power to the raw material or the raw material to the power? Is the deciding factor a good supply of labour or the supply of the right kind of labour? Or is the main consideration to be transportation and the ability to use a variety of routes to a number of different markets? All these questions have to be asked before a factory is built, and they are all geographical.

Economic and Political Factors. Technological, economic, political, and other considerations enter into industrial localization. They should not be ignored by the geographer, because they may often be just as important as the basically geographical factors discussed above. When

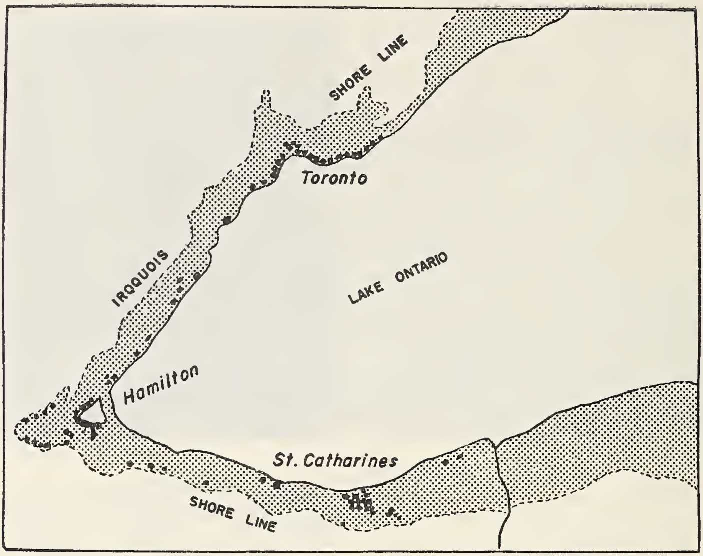


Fig. 10·5. Industries located along the Ontario plain where they find ample flat land.

steam power replaced water power, European and American industry moved from valleys in the hills to coal-fields. This one technological change meant an almost complete shift in the pattern of British industry. (See Fig. 10·6.)

INDUSTRIAL INTERDEPENDENCE. Industrial organization often results in a linking together of many activities. Thus, in addition to the automobile plant, the manufacturing of automobiles requires steel plants for the metal parts of the car, machine plants to tool different parts of the complex engine or body, textile plants to make cloth for upholstery and seat covers, rubber plants to manufacture the tires, electrical plants to make the batteries, and glass-making plants to prepare the windows, windshield, and lights.

Industrial interdependence is, itself, a locating force. Most of the plants mentioned above require chemicals; so chemical plants tend to be built near them to keep them going. Most of them have to rely on something more than automobiles, and therefore, all kinds of other secondary industries grow up to use the additional steel, cloth, rubber, electrical goods, and glass that may not be absorbed in the automobile trade. The secondary industries, in their turn, may attract still others to develop in the area, and so the tremendous series of relationships and inter-connections goes on.

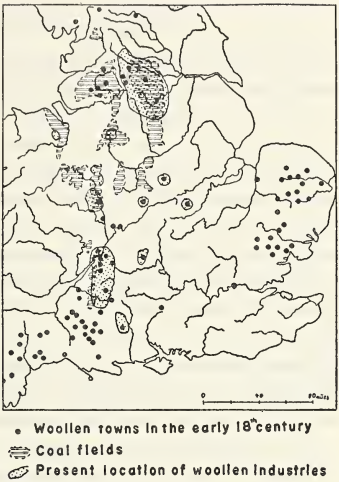

• Woollen towns in the early 18th century
Coal fields
Present location of woollen industries

Fig. 10·6. Shift of the British woollen industry from 18th century water power sites to 20th century coal fields. (After H. C. Darby.)

INDUSTRIAL MOMENTUM. Once an industrial region has developed, with a number of related enterprises, it builds up a certain momentum of activity that helps to keep it going, if not expanding. At times this momentum itself may be the chief factor explaining the continuance of industrial activity there. Local raw materials may have become exhausted; local fuels, on which industry perhaps first depended, may have been depleted. Nevertheless, the presence of factories, machinery, other physical facilities, labour, with all its skills, and the many financial, advertising, selling, and other business contacts will tend to keep the whole industrial complex a going concern. This is particularly the case where the region has had a head start over more recent competitors.

PROTECTION: TARIFFS. Political factors often influence the location and development of industry. In the fourteenth century, England tried to discourage the sale of raw wool abroad and imported Flemish weavers to further its own cloth-making trade. Instead of remaining content with the stage of primary production, raising and selling wool for others to make into cloth, England developed the textile industry for which it is now so famous the world over.

Another means of stimulating home industry has been to put up tariffs to make it at least as dear for people to buy foreign products as to obtain national ones. Thus the "national policy" of Sir John A. Macdonald in Canada helped to establish the Canadian steel industry and other industries, until eventually they were able to meet most of the nation's demands. Previous to the application of tariff, Canada had found it difficult to establish an iron industry in face of competition from the United States, England, and Scotland (with older and larger concerns) and had to import most of its iron or iron goods. With the protection of the tariff, Canada was then able to start many businesses and meet her own needs. However, the areas where those businesses actually located themselves were largely determined by geography. Iron and steel plants were set up on the Sydney coal-field near Newfoundland iron, or in Hamilton and Sault Ste Marie, on the iron and coal routes of the Great Lakes.

Much later, when the Commonwealth countries adopted "empire preference" and agreed to give each other better trading terms than other nations, many branch firms of great American industries established themselves in Canada. They did this largely to get within the tariff barrier created by imperial preference.

FRONTIERS. Political boundaries and the general balance of power in the world may affect trade and industry. When the Turkish Empire grew up around the east end of the Mediterranean, it put a stop to Europe's eastern trade by overland routes across the Middle East to the Far East. As a consequence, Europe launched out upon its momentous series of ventures on the seven seas, and the Atlantic countries, instead of the Mediterranean, became the chief commercial and industrial areas of the continent. This political factor thus changed the entire geography of world trade and helped to begin the epoch of the New World.

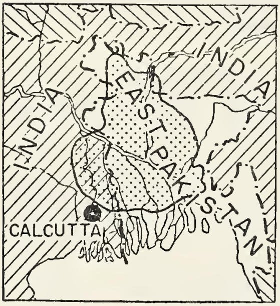


Fig. 10·7. The influence of political frontiers on economic geography. With the creation of India and Pakistan, jute-growing, (shown in the stippled area) mainly in Pakistan, was separated from jute-milling, mainly done in India. National policies militated against a purely economic adjustment to this situation, with the result that India is now trying to enlarge its jute-growing areas to satisfy its mills, and Pakistan to build mills for its jute-growing area.

In Canada, the political frontier changed before the major industrialization of the country took place. Consequently, industries did not decline or spring up with the shift of the frontier. This is just what they did do, however, in Europe and Asia. Until the Revolution, Russia's main industries were near her south-west border, in the Ukraine. In order to make herself less dependent on these rather vulnerable industries, Russia has developed many industrial sites in the hinterland and particularly in Siberia. In Asia, the splitting of the lower Ganges plain between India and Pakistan cut off most of the jute mills in Calcutta (India) from most of the jute plantations in the Ganges delta (Pakistan). Therefore, Pakistan is trying to develop jute-making factories in her part of the plain while India is encouraging the raising of jute on her sector. (See Fig. 10·7.)

STAGES OF INDUSTRIAL DEVELOPMENT

As a result of the geographical, economic, and political factors considered, all of which have strong localizing effects, industry becomes distributed in definite geographical patterns. These vary, however, according to the stage of industrial development.

The Canadian Situation. Two main stages of development, embracing domestic and mass production, have occurred in Canada. In the earlier stage, there was a general scattering of mills and workshops. Gradually, as industry changed, it concentrated, until today, in a vast land that stretches nearly 4,000 miles from east to west, by far the greater part of the nation's industry lies in the 750 miles from Quebec to Windsor. Indeed, Ontario and Quebec dominate Canadian manufacturing, together producing 79 per cent of the gross value of Canadian goods. Thus, in about one-fifth the span of the country, four-fifths of its manufactures are made. This is a high degree of concentration. It would be instructive to trace its development.

Domestic Stage. Canada's industries were slow in developing. In the seventeenth century, when Newfoundland, the Maritimes, and Quebec were opening up, the sparse population did not offer a large enough market to justify the establishment of manufacturing centres. Fur trading and fishing were the principal activities. Trade continued to satisfy the colonies, in the main, until the late eighteenth century. By then, many more settlers had come into this country, including many Americans into the Maritimes and large numbers of Loyalists into the Maritimes, the Eastern Townships of Quebec, and Southern Ontario. There began to be a sufficiently populous market to make it worthwhile manufacturing goods.

The mercantile policy of the times militated against extensive industry; the merchants wanted to sell the raw materials produced in Canada to Britain and British goods to Canada. Nevertheless, there was room for local industries to meet immediate needs. They were what may be described as domestic industries, because they used home-grown products for the home market. They existed on a workshop or small-mill basis; they never drew their materials from far, neither did they distribute their goods widely; they used water power as their chief source of energy, and employed only a few men, forming a small proportion of the population.

As a result, there was a very irregular, *scattered* pattern of distribution, with no marked concentration. Little mills and workshops were found in every community, making flour, chopping feed, tanning leather, manufacturing cloth and the simpler tools of the farm and of the home.

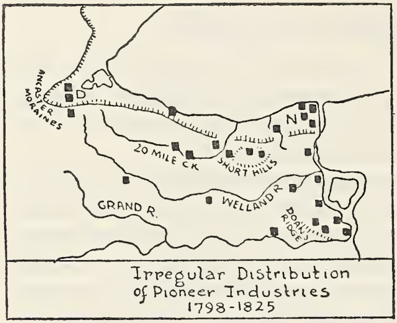


Fig. 10·8. Pioneer industry in Canada was quite scattered, choosing natural water-power sites as in the Niagara Peninsula. (Scale: ⅜ inch = 10 miles.)

The *local site* favouring *water power* dominated the distribution, industries locating themselves on the edges of steep valleys where mill dams could be built and a head of water developed. (See Fig. 10·8.) Fortunately, thanks to the hilly nature of the Canadian Appalachians in Eastern Quebec, the Maritimes, and Newfoundland, and to the presence of the Shield, the Frontenac Axis and the Niagara Escarpment in Western Quebec and Southern Ontario, there were many such sites. Even where hills were absent, the frequent presence of rejuvenated streams, cutting down from the base levels of glacial strands to the existing levels of sea and of lake, made a wide scattering of water-driven mills possible.

The few places where industries did cluster together were at favoured localities in which several mill streams joined, or flowed near to each other. Thus at Toronto, the near approach of the Don and the Humber, and at Hamilton, the grouping of streams and waterfalls in the great Dundas re-entrant to the Niagara Escarpment did allow a certain assembly of mills and workshops.

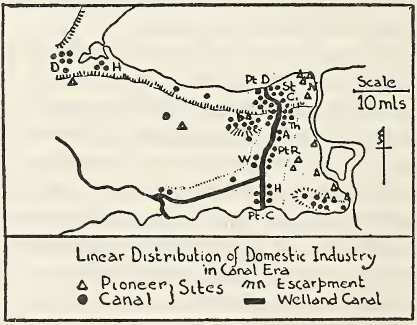


Fig. 10·9. Domestic industry tended to align itself with canals and other artificial water-power sites as seen here in the Niagara Peninsula.

In the early nineteenth century, a better, steadier source of water power was found in the canals which were built along the Great Lakes-St. Lawrence system and in tributary river basins. The Welland Canal circumnavigated Niagara Falls and connected Lake Erie with Lake Ontario. The Trent Canal connected Lake Huron with Lake Ontario crossing the moraines of central Ontario. The St. Lawrence canals by-passed the stretches of rough water in that great river. The Rideau Canal linked the Ottawa Valley to Lake Ontario. The Richelieu Canal made its way from the Champlain Gap to the Lower St. Lawrence. Along all of these waterways, there were sections where water could be deflected through mills. Consequently, there was a distinct tendency for industry to move to the canals. Thus a *linear pattern* of mill distribution came into being, challenging, and in many places, replacing the earlier scattered pattern. (See Fig. 10·9.)

At the same time, the mills were placed on good water routes. **Transportation** became an important influence in the concentration of industry. Goods began to be traded not only to the immediate community around the mill but to other centres farther away. This was a distinct advance in industrial development. It brought competition into play between industrial areas. As a result, instead of trying to produce most or all of the goods required in the neighbourhood, each area started to specialize in those goods for which it was particularly suited. In other words, industries and industrial areas began to be differentiated.

Textiles went ahead in places like Hamilton and Dundas where, on the rocky crests of the Niagara Escarpment behind, there were a great number of sheep farms, arable farming being difficult. St. Catharines was noted, for a while, for its tanning industry because of the large local supply of tanning bark from dense woods of oak. Toronto became a flour-milling and tool-milling centre since it was the focus of agricultural development both in south-west and in central Ontario. Ottawa and Hull were well known for their lumber since they were close to the forests of the Shield at sites of water power. Towns along the Richelieu had many textile mills, again because they were close to hilly country where sheep farming was ideal.

In all these instances, **access to raw materials** was a fairly important consideration in the kind of industry that was developed and in its success. In some cases where the raw materials became used up, the industry died. Thus when the supply of tanning bark was depleted near St. Catharines and the town no longer had this special advantage, the tanning industry declined. On the other hand, in Toronto, even though wheat farming diminished throughout its hinterland when the Prairies were opened up, **industrial momentum** kept flour milling going. (However, partly because of transportation advantages, Montreal became the chief eastern terminal for Prairie wheat, surpassing Toronto, and so it superseded Toronto as a flour-milling site.)

In the middle of the nineteenth century, between 1850 and 1880, occurred the great railway boom, when the cities of the Great Lakes-St. Lawrence Lowlands were linked together by railways and so had swifter, better means of trading with each other. At the same time, the railway system extended out beyond to the Maritimes and the Prairies, to New York and Chicago. A considerable impetus was given to the exchange of goods over quite extensive distances. Population was growing, and people began to demand more and better services. They were willing to pay for an article which, though made at some distance, could be brought quickly to them, if it was better than the local thing. So the market factor became increasingly important, and industries tended to shift to and concentrate at the main railway junctions from which **access to the market** could best be secured.

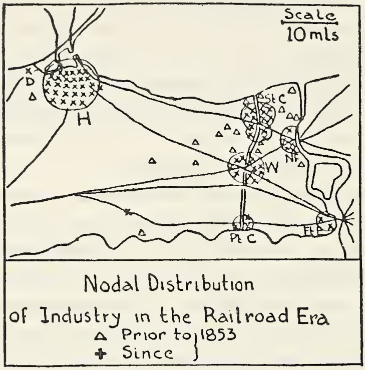


Fig. 10·10. Modern industry groups itself at great railway nodes where coal and raw materials can readily be assembled. Niagara Peninsula. H - Hamilton; St.C - St. Catharines; W - Welland.

This meant that there was a new grouping of industry; it tended to abandon canal sites and to collect at railway *centres*, thus creating a **nodal pattern** of distribution. (See Fig. 10·10.) In some cases, the railway node might occur at or near a former centre of water communication. In that event, there was a new emphasis of a former grouping. In any case, industry became truly concentrated for the first time, and the important railway terminals, gateway towns, and junctions attracted the chief industrial activity and forged ahead. Montreal, Toronto, and Hamilton were especially significant and developed large clusters of mills around them.

For a time, most of the mills continued to use water power. But the railways brought coal to central Canada. The Lower Great Lakes and the Montreal Plain are both fairly near to the enormous Pennsylvania coal-fields. Short rail hauls from the coal mines took the fuel to coaling ports on the lakes and then, during the open-water season, transportation via numerous waterways was effected. With fairly cheap coal, tremendously greater and far more convenient means of power were available for industry, and it converted from water to steam power. This enabled mills to liberate themselves from the control of mill sites in narrow valleys and to choose more accessible sites on flat, open plains around the railway nodes. With this great advance, domestic industry may be said to have passed to factory production and modern technology.

Factory Industry. The displacing of the small mill and the workshop enabled industry to develop on a larger scale and, eventually, to engage in mass-production methods. Consider what this change-over meant. In former days the technique of converting raw materials into consumer goods went with small-scale production: a small quantity of raw material was handled; a small amount of power was used; a small labour group was employed; a small investment was committed, and a small output resulted.

In the mill, there were a number of small, individual machines. As many as possible were worked by multiple belts from the one or two main mill wheels turned by the mill race, but the number of machines was limited. The sheer mechanics of driving a group of machines from one shaft prevented their extensive use. Customarily, each machine was fed raw materials and worked by one or more operators, and so there was considerable reliance on hand labour. Many of the stages in processing the material required manual intervention, and this tended to slow down production. It also meant that industry had to rely on skill to a considerable extent. Unskilled labour did not have much place. Therefore, if skilled labour was in short supply, industry could be seriously limited.

In the workshop, where water power was not applied, manual labour was used to operate hand-and-foot-driven machinery. Production required more time, more skill, and more dependence on hand labour than at the mill.

Of course, the finished product was likely to be a work of art, or at least of real craftsmanship. But that made it more expensive when mass-produced goods came onto the market and was one reason for the decline of domestic industry. (Nevertheless, it should be pointed out that there is still such a demand for handicraft production that in parts of Vancouver Island, Ontario, Quebec, and the Maritimes, but most particularly in Quebec, modern workshop industries still continue. They rely for their success on the quality of their work and the appeal of their artistry.)

The factory, in contrast to mill and workshop, uses a huge space, where many large machines operate all from the same source of power, where the application of great mechanical power permits the rapid processing of vast quantities of raw materials, and where a large, steady output of uniform quality may be obtained. Factory production relies on self-operating machines as much as possible, and there may be many machines to a single operator. This saves human labour. At the same time, machine production is aimed at ruling out exceptional problems and situations; it is simplified to an extreme and does not demand much skill in operation. At least, the skilled part of the work may be small compared to the unskilled. Thus large groups of unskilled labour can be used to keep production going.

The great success of this type of industry is that it can produce in vast quantity, at standard quality, with great efficiency, and at comparatively low cost. However, it needs space, excellent transportation, large supplies of raw material, immense amounts of power, a good labour supply, and the assurance of a large market. (See Fig. 10·11.)

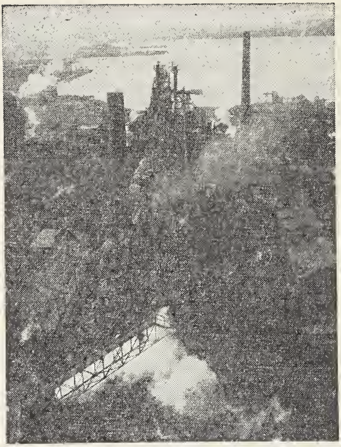
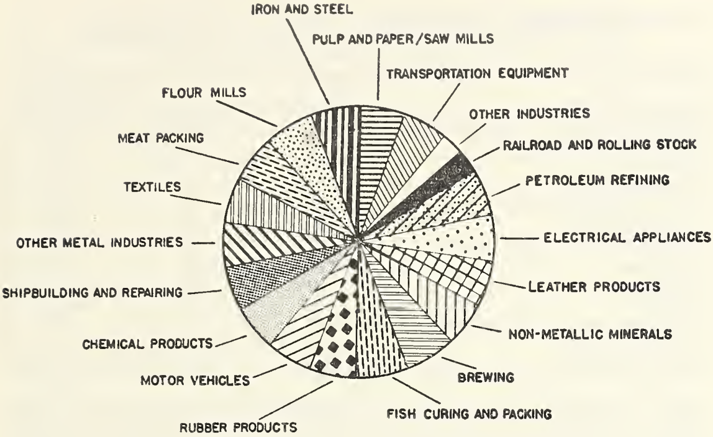

National Film Board

Fig. 10·11. Steel Co. of Canada plant at Hamilton Harbour. Note the great area required for the assembly of so much machinery and raw material.

This last factor kept factory industry back in Canada until the beginning of the twentieth century. There was not the population in the country to supply a sufficient market to support extensive industrial development. Industrialists were not prone to take the risks involved in large-scale factory production without an adequate number of potential buyers. However, with the rapid opening up of the Canadian West and with the waves of immigration that followed World War I and that have also followed World War II, Canadian industry was given, and has continued to possess, a challenging market within the country itself, not to mention overseas. The opening up of the Prairies demanded railways, roads, telephone lines, fences, elevators, farm machinery, and a multitude of consumer goods on a tremendous scale. Similarly the development of mining and lumbering in the mineraliferous and forested parts of Canada—the Appalachian ranges of the Atlantic provinces, the Shield of Quebec and Ontario, and the Cordilleras of Alberta and British Columbia—required huge quantities of machinery and equipment. In addition to the existing railways and canals, trucks by the thousand were needed to handle these goods. Air routes were developed to quicken communication and serve areas beyond the settled frontier. Ships were built to carry trade overseas. Canada came to have all that was necessary to be an industrialized nation.

The more industry grew, the more it concentrated on the central provinces. (See Fig. 10·12.) Eventually, this area became the centre of the greater part of Canada's automobile, aeroplane, and ship manufacturing; the making of pulp and paper, and chemical products; rub-



Key to Figs. 10·12, 10·16, 10·17, 10·18.

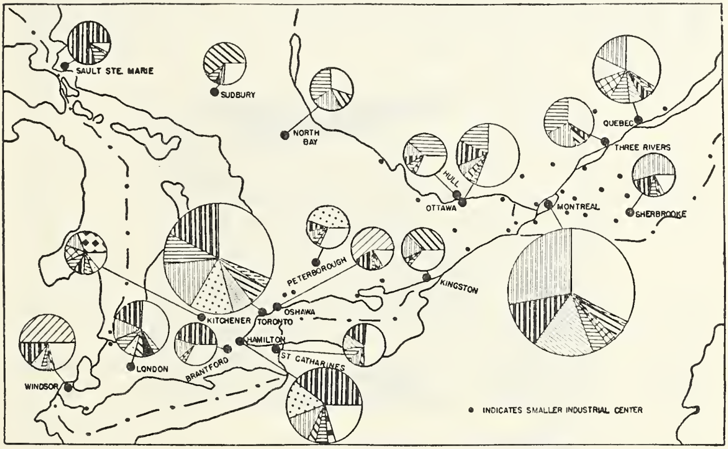


Fig. 10·12. Location of principal industries in the south-central provinces.

ber and leather goods, and electrical appliances; textiles and furs; iron and steel, and steel products; and food preparations, including flour. The following table shows the current situation:

PERCENTAGE OF THE TOTAL CANADIAN PRODUCTION IN TEN LEADING MANUFACTURES (BY ORDER OF IMPORTANCE) PRODUCED BY THE CENTRAL PROVINCES

MANUFACTURES	ONTARIO	QUEBEC	CENTRAL PROVINCES
Food and beverages	40	25	65
Iron and steel	69	19	88
Paper products	37	41	78
Transportation equipment	80	13	93
Wood products	25	21	46
Non-ferrous metal products	47	37	84
Textiles	39	55	94
Clothing	34	57	91
Chemicals	58	29	87
Petroleum and coal products	33	33	66
All manufactures	49	30	79

The Localization of Industry: Central Canada. This high concentration of industry in the Canadian manufacturing belt is due to a number of geographic and historic reasons. The first of these is the geographical position of the area. The general setting is, in this case, the key resource, because there are few supplies of fuel and raw materials for industry in the area itself. (See Fig. 10·13.) Nevertheless, the region is in an easily accessible location, where it can readily obtain

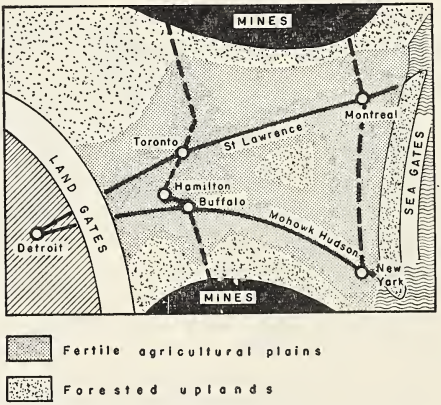


Fig. 10·13. Highly diagrammatic sketch of the industrial and commercial parts of the central provinces. Set between the oceanic and continental gates, on the principal routes of immigration, in a fertile plain bordered by uplands rich in forests and either metal or coal mines, these provinces were unusually well endowed for economic leadership.

raw materials and fuels and whence it can send out its finished products to the widest possible market.

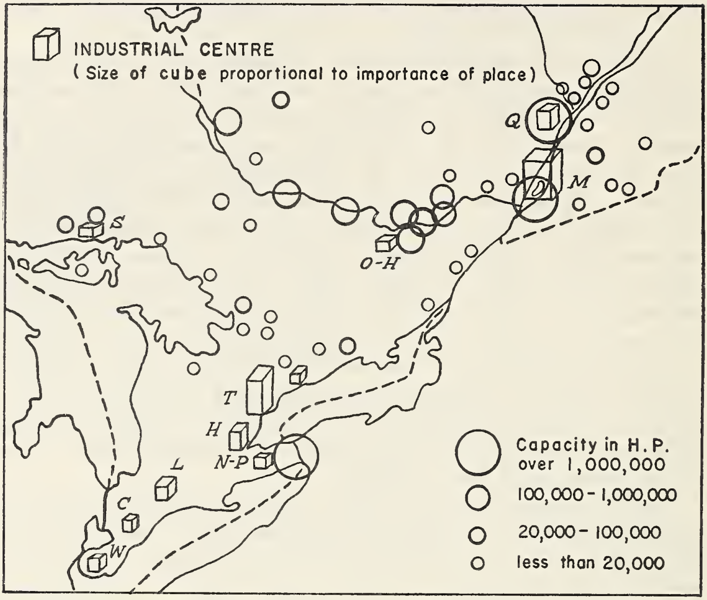
It lies between western and eastern Canada, between the developing North and the highly developed United States to the south, between the chief ocean gateway into our country and the main openings into the interior. Naturally many industrialists have chosen this region for their factories. For instance, Mr. McCormick of the International Harvester Company said of the Hamilton branch, "The location, geographically, makes an ideal place from which to ship agricultural implements to the great wheat-raising districts of western Canada, as well as to the seaboard for export trade." This testimony could be matched by that of many other industrialists for other cities, from the automobile centre of Windsor to the pulp and paper centre of Quebec.

Along the northern rim of the region, the Shield provides many raw materials, such as nickel, copper, platinum, gold and silver, and iron, together with lumber and wood pulp. All these products are very valuable to the nation's economy, and most of them are in demand in the United States and in western Europe.

Along its southern rim, the region is close to American sources of supply, including the vast coal-fields of Pennsylvania, western Virginia, and northern Kentucky, the mid-continental oil-fields, and the tremendous iron deposits around western Lake Superior. These sources were what really enabled Ontario and Quebec to develop industrially, and the deep extension of Ontario into the United States must be counted one of Canada's chief assets. Easy contact throughout the Canadian manufacturing belt can be made with New York (via the Mohawk valley or Lake Champlain), with Buffalo and Pittsburgh (via Niagara Frontier), and with Detroit and Chicago (via Windsor Frontier), main centres of the American manufacturing belt.

Although long dependent on American fuel for steam power, the region has considerable water power resources of its own, or near at hand. Along the Great Lakes-St. Lawrence system and at the edge of the Shield, immense progress has taken place in the provision of hydro-electric power to feed the numerous industrial developments. (See Fig. 10·14, page 174.)

The region owes its growth, of course, to human ingenuity and endeavour. It is fortunate in being on the chief historic route of immigration and settlement in Canada—the St. Lawrence system—and so has the first chance of attracting artisans, technicians, business and professional men, and others into its various enterprises. Labour supply has been ample and varied. A growing population has supplied a larger home market than in any comparable region in Canada.



C, Chatham; H, Hamilton; L, London; M, Montreal; N P, Niagara Peninsula; O-H, Ottawa Hull; S, Sudbury; T, Toronto; W, Windsor.

Fig. 10·14. Power sites and industrial centres in the south central provinces.

Finally, the local geography of the region is in many respects ideal. The southern part extends to the most southerly point in Canada and therefore has a milder climate than most regions outside of the Pacific coast. The cost of keeping factories warm in winter and of maintaining transportation is not too excessive, by Canadian standards. The summers are warmer than elsewhere in Canada, and this has given rise to an active agriculture, based on special crops such as tobacco, sweet corn, fruits, and canning crops, providing the raw material for many food-processing industries. Agricultural areas are densely populated, for Canada, and make an excellent ready market for machine and other types of industries. (See Fig. 10·15.)

Most of the region was floored by glacial seas or lakes. Thus roughnesses in its topography have been partially smoothed out, and there are large flat terraces on which plant expansion may develop and along which roads and railways, with gentle gradients, may be built.

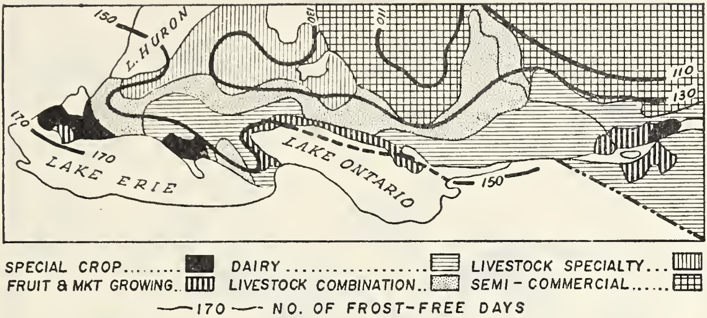


Fig. 10·15. Climate and special crops in the central provinces. The frost-free season, exceptionally long for Canada, favours special crops such as corn, sugar-beets and tobacco, fruit orchards and market gardens. Most of the region has a frost-free season of over 130 days and is thus suitable for the more profitable forms of commercial agriculture, particularly those supplying fresh food to industrial settlements. Such rich agricultural lands provide raw materials and an excellent market for industry.

THE LOCALIZATION OF INDUSTRY: EASTERN AND WESTERN CANADA

Although the central provinces have through their very position dominated Canadian industry, yet manufacturing is significant in other localities as well.

The Atlantic Provinces and St. Lawrence Gulf. (See Fig. 10·16, page 176.) In Newfoundland, rich in fish and forests, there are fish-packing plants in St. John's, Bonavista, and Corner Brook. One of the largest pulp and paper mills in the Commonwealth is that at Corner Brook. Fish curing is also important in Halifax, Lunenburg, Yarmouth, and Saint John in the Maritimes, while large pulp and paper mills are found at power sites in densely forested valleys of New Brunswick.

Agricultural manufactures are not so important except in Prince Edward Island and in the Annapolis Valley, Nova Scotia, where there are various creameries and canneries. The canning of apple sauce and apple juice is compensating for the drop in the export of apples to Britain. The packing of imported tea, coffee, and cocoa, and the making of refined sugar and of chocolate from imported sugar and cocoa are fairly important at Halifax and Saint John.

The chief industrial areas, where indeed little but industry exists, are in the steel centres at Sydney and New Glasgow where iron from Newfoundland is smelted with the use of locally derived coke.

North-east Quebec has an important, though restricted, manufacturing region, tributary to the St. Lawrence Gulf. It lies up the Saguenay at

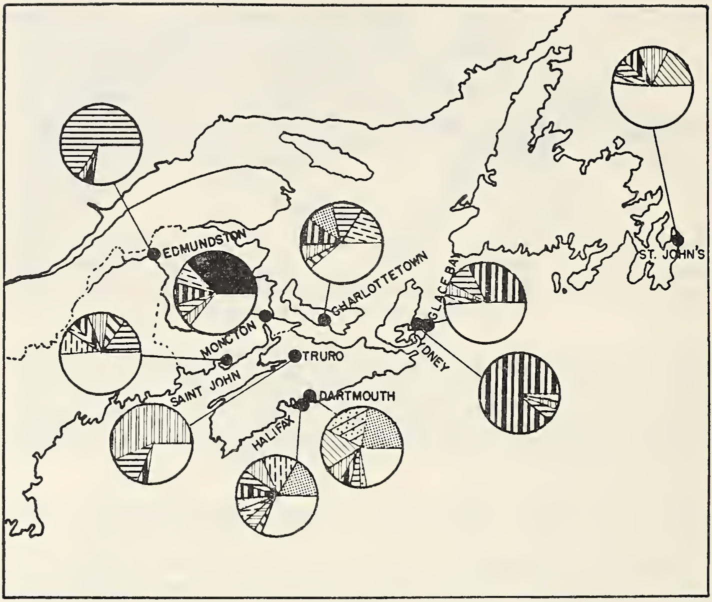


Fig. 10·16. Location of principal industries in the Atlantic provinces. (For key, see page 171.)

Chicoutimi and Arvida. Here great quantities of electric power have made possible aluminum refining from imported ore and some pulp and paper manufacturing from the trees of the nearby forest. Seven Islands, the rail terminal for the vast iron ore field of Labrador-Ungava, may develop industries in the course of time.

Prairie Provinces. (See Fig. 10·17.) Industry is chiefly located at the great transportation junctions. Winnipeg, Edmonton, and Calgary are the main centres. Winnipeg guards the entrance to the Prairies and controls the access to the East. Here, therefore, railways converge between the international border and Lake Winnipeg and fan out again. The immense agricultural wealth of the Prairies is funnelled through this narrow gap, and so there has arisen the opportunity for storing wheat, making bread, preparing dairy goods, and packing meat. The textile industry, next in importance, includes the making of bags to contain wheat and the development of fur goods. (It is the Canadian headquarters of the Hudson's Bay Company.) The manufacture of agricultural implements is also significant.

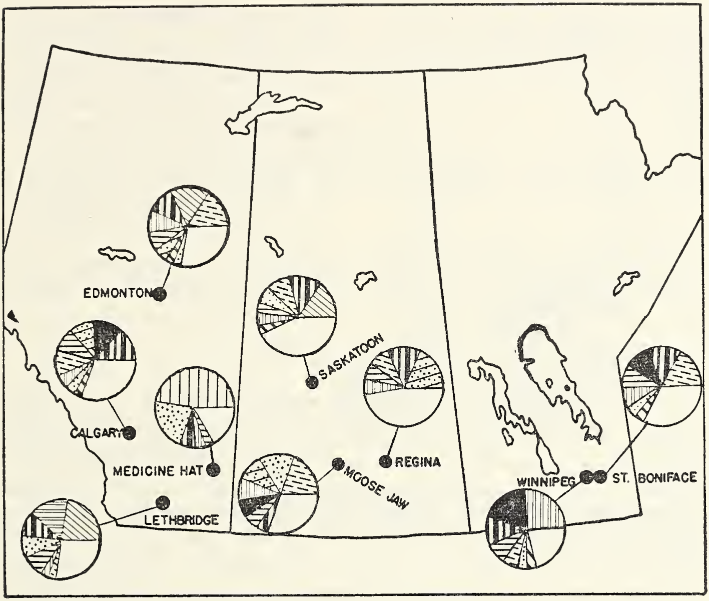


Fig. 10·17. Location of principal industries in the Prairies. (For key, see page 171.)

Edmonton, gateway to the North, commanding access to the Mackenzie, to the Alaska Highway, and to Yellowhead Pass in the Rockies, has boomed in recent years as a centre of handling traffic and supplies going to northern settlements, particularly mining ones, and as the focus of the new oil industry. It is also the junction of routes in a rich agricultural area, with the Peace River Block not far removed. The products of important industries are processed meat, other food preparations, derivatives of petroleum and coal, and chemicals. Transportation equipment and machine industries are growing.

Calgary's industries are not unlike those of its sister city. It was the original centre of the oil industry, and petroleum products are still important. However, its chief function is to act as the market for the rich agricultural land of the south-west Prairies, including the cattle ranges and the wheat-producing lands in the irrigated or in the dry-farming areas. Meat packing and flour milling are its main manufactures.

Lesser centres of agriculture, transportation or miscellaneous manufactures are Medicine Hat, Regina, Saskatoon, and Brandon.

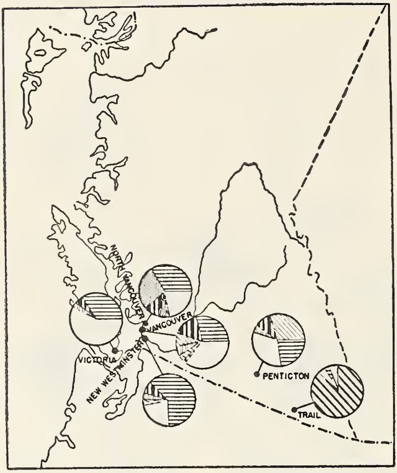


Fig. 10·18. Location of principal industries in lower British Columbia. (For key, see page 171.) The size of the circles is not proportional to production.

The Fraser Delta. (See Fig. 10·18.) The Fraser River draws to it much of the agricultural, forest, and mining activities of the southern mainland of British Columbia. At the same time, its delta commands the Inner Passage between Vancouver Island and the Coast Range and is thus able to attract the products of mines, lumber camps, fisheries, and farms up and down the coast. It is not surprising to find, therefore, that at Vancouver and New Westminster there is a high concentration of industry. The chief manufactures are the making of food, wood, and metal products. The principal activities comprise food processing and packaging. The region is famous for its fine lumber products, derived from the magnificent forests of western cedar and Douglas fir. Paper making from forest resources and the manufacture of chemicals, partly from forest and partly from mine derivatives, but also from imported chemicals, are becoming significant. The making or repairing of ships, iron castings, ships' parts, and sheet metal products is expanding.

QUESTIONS

A

1. What role do relief, climate, and drainage play in the localization of industry?
2. What human factors affect the localization of industry?
3. Examine Fig. 10·11 carefully. Why does a modern steel mill need a wide expanse of flat, low land?
4. From Fig. 10·12 discover which cities are noted chiefly for (a) steel, (b) textiles, (c) motor vehicles, (d) pulp and paper, (e) electrical goods.

B

5. Why did Montreal grow into a great industrial centre? (See Fig. 10·1.)
6. Make a diagrammatic sketch of (a) the Windsor region, (b) the Winnipeg region, (c) the Vancouver region, showing their relation to sources of raw materials and to markets. (See Fig. 10·3.)

7. Industry has moved from sites of water power to coal-fields or to places where coal can be cheaply shipped. On what coal-fields are the British woollen mills now mainly located? Are there still areas of production not on coal-fields? What proportion of the former water-sites has been abandoned for coal-based ones? (Fig. 10·6.)
8. List the factors, depicted in Fig. 10·13, responsible for the concentration of industry in S.W. Quebec and S. Ontario.
9. List the towns of the Atlantic Provinces, the Prairies, and southern British Columbia according to their *one* or *two* dominant industries. (See Figs. 10·16, 10·17, 10·18.)

C

10. As industry becomes progressively more competitive and specialized, it becomes increasingly dependent on geography. Discuss this statement.

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CHAPTER XI

The Geography of Manufacturing: Heavy and Light Industries

THE IRON AND STEEL INDUSTRIES

It would be impracticable in a general text to treat all the major industries of the world, a subject proper to a survey of economic geography. Therefore, a principal heavy industry, iron and steel, and a principal light industry, textiles, will be discussed. The main object is to show to what extent geographical factors influence the rise and distribution of industry.

The iron and steel industry of the world is the one on which modern civilization chiefly depends. (See map on world distribution of iron ores Fig. 9·11.) We live in a machine age, and by far the greater part of the world's machinery is made from steel. Indeed a nation's productivity as an industrial power is rated largely in terms of steel capacity. The rating in 1951 was:

COUNTRY	PRODUCTION	COUNTRY	PRODUCTION
1. U.S.A.	95·5 m. tons	6. Belgium	5·1 m. tons
2. U.S.S.R.	31·3 "	7. Japan	4·7 "
3. U.K.	15·9 "	8. Czechoslovakia	3·3 "
4. Germany	15·0 "	9. Canada	3·2 "
5. France	9·8 "	10. India	1·5 "

Forecasts by the *London Economist* indicate that by 1961 production will probably be as follows:

1. U.S.A.	110 m. tons	5. Japan	6 m. tons
2. U.S.S.R.	50 "	6. Canada	5 "
3. *Schuman States	50 "	7. Rest of Commonwealth	5 "
4. U.K.	20	8. Latin-America	3 "

Steel is made from iron, which is a refinement of iron ore. The iron ore has to be smelted under great heat, its impurities removed and carbon added. To do this the ore is mixed with limestone and coke in a huge blast furnace, through which a hot blast is forced at great pressure. (See Fig. 11·1.) The material melts and begins to fuse. The limestone fuses with the impurities; the pure iron fuses with the carbon in the coke; a slag forms, from which the iron gets some silicon. Then at last the iron sinks to the bottom of the furnace from which it can be run in white hot streams into moulds or "pigs". It takes about 2 tons of ore, 1 ton of coke, and ½ ton of limestone to make 1 ton of pig iron.

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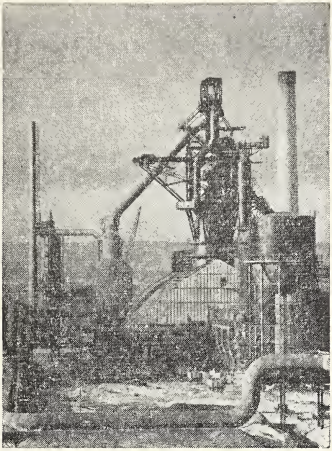
*The states which have pooled their iron and steel production under the Schuman plan are Germany, France, Italy, Belgium, Holland, and Luxembourg.



British Information Service

Fig. 11·1. A blast furnace is the modern means of turning iron ore, coke, and limestone flux into iron. Here at the Shotton furnace, trucks of ore are being fed into the furnace shed.

The pigs are then remelted and treated in the steel mills, although, in plants making both iron and steel, the iron may be run directly from the blast furnaces to the steel mill. There are a number of methods of making steel: the open-hearth, the Bessemer, and the electrical methods. The open-hearth system uses ores of intermediate grade together with steel scrap and alloy metals. (See Fig. 11·2.) It needs large quantities of fuel, however. The Bessemer furnace uses much less fuel, but does not utilize scrap iron and steel. It forces air at high pressure through a bath of molten iron. The electrical method uses much scrap and is well suited to making high-grade steels, wherever hydro electricity abounds. In the steel mills, the iron is treated with carbon, silica, and manganese, in carefully calculated proportions, and thus hardened into steel. Tungsten, chromium, molybdenum, vanadium, and other alloys may be added to produce extremely hard alloy steel.

British Information Service

Fig. 11·2. Iron, mixed with other ingredients, is turned into steel in these open-hearth furnaces, at Ebbw Vale, Wales.

Iron and steel centres use huge quantities of materials, some of which are very heavy. They depend for their success on relatively easy or cheap access to raw materials, nearness to good coking-coal or to hydro electricity, and ability to contact a wide and ready market. In addition, it should be remembered, they use a considerable amount of oil for lubrication, require vast quantities of water for cooling and cleaning, depend on a good labour supply, and need plenty of flat land.

Chief Iron and Steel Producing Regions. North America produces more than half the steel of the world although it has less than a tenth of the world's population. This is due largely to the great emphasis placed on the use of machinery by American peoples. It also results from truly immense reserves of coal and iron in which this continent is the richest in the world. There is a large market for steel goods in North America itself, and it is well placed—between western Europe and eastern Asia, the two areas of densest population in the world—to serve the world market.

The **United States** is the chief producer. Compared with even highly industrialized countries its output is out of all proportion. Thus, although the United States has only three times as many people as the United Kingdom, it produces six times as much steel. Its chief concentrations of iron are around the western end of Lake Superior. Its chief coal-fields are on the flanks of the Appalachians between Lake Erie and the mid-Atlantic coast. Coal and iron are found together at the southern extremity of the Appalachians in Alabama.

The main iron and steel centres (See Fig. 11·3) are at favoured sites on the Great Lakes, accessible at once to iron and coal; on the Appalachian coal-fields, not far removed from water-borne iron ore, or with iron in the vicinity; and on the mid-Atlantic coast, near to native coal and accessible to ore from Labrador, Newfoundland, Cuba, and Venezuela, and North Africa. The chief steel-making cities are Pittsburgh and Youngstown, on the western Appalachian coal-field; Birmingham, on the southern Appalachian coal and iron fields; Cleveland and other Lake Erie cities at coaling ports for the movement of coal "up lake" and iron-unloading ports for the "down lake" movement of iron; Gary-Chicago, near the vast mid-west market and on water routes to both coal and iron; Duluth, the iron port of the west Superior iron fields and with water-borne access to Appalachian coal; Sparrow's Point and the plants of eastern Pennsylvania and Maryland, which are near to Appalachian coal and have the huge seaboard market.

The Pittsburgh region alone produces more steel than the whole of Great Britain. The rivers pass through the coal-field. Excellent coking-coals exist. Coal or coke comes to the mills over a very short haul. Local iron has long been exhausted, but the iron-unloading ports of Lake

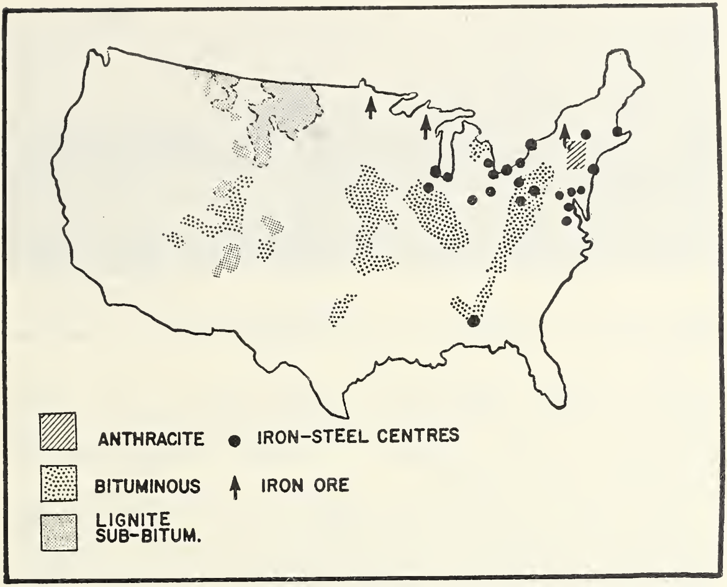
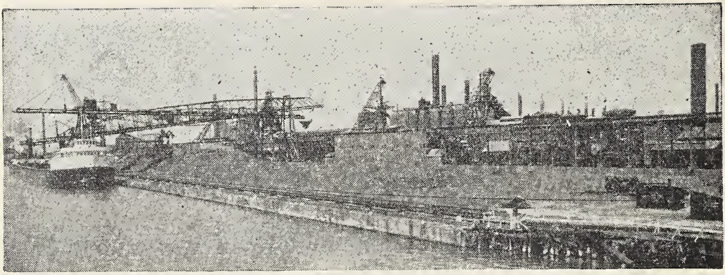


Fig. 11·3. Main iron and steel centres, U.S.A.

Erie are close by, where iron from lake Superior or Labrador can be cheaply trans-shipped. Many of the principal railways of the eastern seaboard pass through the region to the mid-west; thus Pittsburgh commands both eastern and western markets. The rivers are large enough to supply sufficient water for mill purposes; a dense population provides a good labour supply; initial achievement and industrial momentum since have given historic advantage. The chief disadvantage is the local site where the deeply entrenched valleys often do not provide enough room for plant expansion.

Canadian production is quite small compared with that of the United States, but the reasons for this are obvious. Canada has, or can develop the necessary power; she has unlimited raw material; the geography of the country ensures facility of materiel transportation. Unfortunately the scarcity of population in a country of vast distances prevents the establishment of heavy industries to supply the home market.

Nevertheless, Canada's production on a per capita basis is about equal to that of the United Kingdom and is increasing rapidly. As the



Algoma Steel Corp. Ltd.

Fig. 11·4. The steel mills at Sault Ste Marie, though not on either a coal-field or an iron field, are strategically placed on the Great Lakes route to secure cheap coal and iron.

Canadian machine industry grows, using Canadian steel to make equipment and material for farming on the Prairies and for lumbering and mining in western, northern, and eastern forests and mines, the steel industry should expand.

Until recently, Canada was thought to have little iron ore, with the exception of the large Wabana deposits in Newfoundland. Now very considerable deposits have been discovered in the Shield of western Ontario (Steep Lake), and north-eastern Quebec and Labrador (Knob Lake). Their development and that of lesser deposits in central Ontario should help to make Canada independent of supplies of iron from the United States.

The chief centres of production are Sault Ste Marie, Hamilton, Port Colborne, and Welland on the Great Lakes, and New Glasgow and Sydney in northern Nova Scotia. Although they lack immediate sources of coal or iron, the first centres are on the up-lake and down-lake trade in these products. The immense advantages of the Great Lakes waterway thus enable them to assemble raw materials and fuels cheaply. (See Figs. 11·4.) They are central alike for the western, northern, and eastern markets and thus can send their steel easily to the factories where it is most needed. The Hamilton site is particularly favoured with a wide, flat plain coming down to a broad, land-locked harbour. The city makes more than half of Canada's total supply of steel. Nova Scotian centres have the advantage of being on coal-fields and close to Newfoundland iron, but they suffer from their remoteness from the central and western markets in Canada.

European production is considerable and is concentrated chiefly on the coal-fields of western Europe or southern Russia or on ports where coal is exported and foreign iron imported. **Russia** has come to the fore

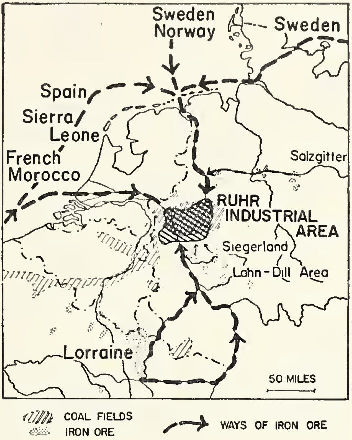


Fig. 11·5. The Ruhr iron and steel industry.

as the single greatest producer; this is due not only to the large deposits of coal and iron close to each other in the Ukraine but to the very large internal market. Recently, strenuous efforts have been made to develop alternative areas to the Dnieper-Donets industrial area in the Urals, around Magnetogorsk, in the Kuznetsk basin and other areas of Siberia, where coal and iron are relatively accessible to each other. **Germany** is the main centre in western Europe. (See Fig. 11·5.) This results partly from the situation of the great coal-field of the Ruhr, in the centre of Europe, with good contacts down the Rhine to Spanish and Swedish ores or up the Rhine to the great market there; from the command of transcontinental railways, giving it access to both west and east; and from a densely settled vicinity where there is an ample labour supply. Formerly, Germany also possessed important steel mills in the west Silesian coal field, which have now passed to Poland.

A revolutionary and most important experiment, called the **Schuman Plan**, is being tried now to "rationalize" the steel production of Germany, France, the Low Countries, and Italy. Essentially this hopes to treat the development of steel as a **geographical** and economic matter, not as a nationalistic one. For the fact is that along the whole of the middle Rhine there is a close grouping of iron and coal deposits. From the nationalistic viewpoint it was unequally divided and therefore often uneconomically used. **France** had the lion's share of the iron in the oolitic deposits of Lorraine; **Luxembourg** also had much iron; yet neither of these countries possessed much coal. Germany had great quantities of coal, in the Saar, Westphalia, and Aachen, while **Belgium** also had large quantities, especially at Charleroi. Political rivalries sometimes prevented a free economic flow of coal to iron fields or iron to coal-fields. Today, it is proposed to make that flow possible, and thus the steel production of all the countries concerned should be increased.

French steel is made mostly in eastern France (Nancy), though some is associated with the coal-fields of central France (St. Etienne). Belgian steel is made at Charleroi and Liège.

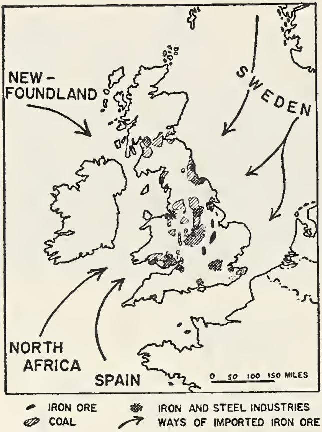


Fig. 11·6. The distribution of the British iron and steel industry in relation to domestic coal and iron fields and sources of imported ore.

Britain is a major European producer of steel. (See Fig. 11·6.) The old workings of iron in the Weald of Kent and in the Forest of Dean were known in Roman times. Much larger deposits of iron, bedded with oölitic limestones, were discovered in Lincolnshire. Early smelting was by charcoal made from the wood of England's dense forests. In the eighteenth century, the use of coke was introduced, and there was a tendency for iron- and steel-making to concentrate on the coal-fields. Sheffield, on the West Yorkshire coal-field, was an example in England; and Motherwell, on the Lanark coal-field, a similar one in Scotland.

However, British ores began to be exhausted, and ores were imported from Norway and Sweden and from northern Spain and northern Africa. The industry, of course, began to shift, and new plants were established at Middlesboro in the north-east and Cardiff in the south-west. Middlesboro soon forged ahead. It is near local iron supplies in the Cleveland hills and very accessible to ores from Scandinavia; it is only a short distance from the Northumberland-Durham coal-field and from limestone supplies; it lies on a deep estuary where ore boats can find good harbourage; there is room for plant expansion; cheap water routes can carry the steel products to steel-using centres like Newcastle and London; and there is a dense population, with a good supply of labour. Much the same conditions prevail for the metallurgical centres of Swansea and Cardiff, near the South Wales coal-field and very accessible to iron and copper from Spain.

Scunthorpe on the Lincolnshire iron field and Barrow on the Cumberland iron field are examples of places where steel making has located itself at the ore site, to which coal is brought.

Czechoslovakia, the leading industrial country of central Europe, is well adapted for steel production. In the Bohemian basin are fairly extensive coal-fields, close to iron ores. More iron can be imported from Sweden by a cheap water haul up the Elbe or from Russia up the Danube. Lying at the heart of Europe, the country has excellent transportation both to west and east. Coal at Kladno and iron at

Nuvic have given rise to steel mills in their vicinity and at Pilsen and Prague nearby. Iron and steel are also found in Moravia, and steel is made at Vitkovice.

Sweden has large reserves of very high-grade iron ore in the Grängesburg, Gällivara, and Kirunavara fields. However, the country lacks coal. Consequently it has been mainly an ore-exporting country rather than a steel-making one. Nevertheless, with the use of coal imported on the return trip, steel making has increased considerably. Sweden has large quantities of cheap hydro electricity, and the manufacture of high-grade steel in electrical furnaces is important. In this case, the ore is often carbonized from charcoal derived from Sweden's extensive forests.

Asiatic production of steel is concentrated mainly on or near the coal-fields or iron fields of southern Siberia, south-east Manchuria and north Korea, Japan, and north-east India. In **Siberia,** coal and iron are found close together in Tashkent, Kuznetzk (or Kuzbass) and the central Amur, where iron and steel production is rapidly developing. Karaganda and Irkutsk are other centres where, although coal and iron are not so close together, they can be brought to each other without too much difficulty. The major problems of Siberian production are the lack of an extensive market or labour supply and the high cost of transporting raw materials or the finished goods over long distances by rail.

In **China**, iron manufacture has gone on for generations on a local basis, using local ore and charcoal from the diminishing forests. In the Shantung Peninsula and southern Manchuria, however, modern coal and iron mining are carried on extensively, and the Mukden area has a significant steel industry. The lack of a machine-using public and of engineering industries to support steel making has been a principal barrier to Chinese development.

Japan also carried on a localized, domestic industry in iron making for a long time. When it turned to modern mass-production techniques, it was more limited than China in not having large quantities of its own iron and coal but more successful in that it soon found a market in a rapidly mechanized way of life. Japan has coal in Hokkaido, its northern large island, although this is not sufficient for its purposes and it has, heretofore, imported good coking-coal from north Korea and Manchuria. It also gets its iron from these centres, from Malaya, and to some extent, from Australia and North America. The chief steel works are in Wakamatsu, northern Kyushu, where coal is at hand. There is a large market in southern Japan in engineering and shipbuilding industries.

India has made rapid gains in steel manufacture. In north-east Nagpur, overlooking the densely settled plains of the Ganges, lie considerable deposits of coal, iron, and limestone flux. Here at Jamshedpur

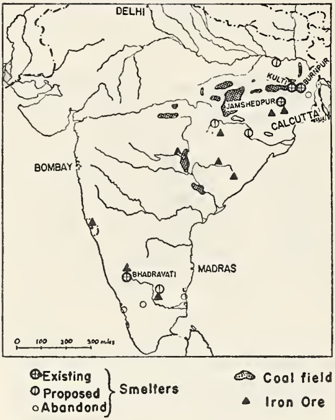


Fig. 11·7. The iron and steel industry in India is mainly concentrated in the north-east where iron ore and coal fields are close to each other. In the south-west a small industry has developed, using the forests (charcoal) and the hydro-electricity of the West Ghats to smelt and harden the local ores into steel. (After J. E. Brush.)

is one of the largest steel mills in the Commonwealth. (See Fig. 11·7.) It is not on either the coal-field or the iron field, although these are nearby. Its location is due to a combination of through routes, a good local site, and, perhaps above all, a satisfactory water supply.

The Southern Hemisphere is, on the whole, still a region of primary production, selling raw materials and food in return for steel products and other manufactured goods. It uses many steel products for mining and agricultural machinery, railways, and construction, yet there are very few centres suited to steel production. This is due mainly to scarcity of coal, especially good coking-coal, and to a rather low population, with low per capita demand which can be satisfied from outside. However, as population grows and as purchasing power increases, steel manufacture will increase. It is carried on at present mainly in Brazil, South Africa, and Australia.

Brazil has much iron but little coal. She tends to export her ore and buy back finished steel products because of the difficulty of smelting her ores and turning them into steel. The plant set up at Volta Redonda in the Paraiba valley (See Fig. 11·8.) is on the iron route to the coast from the iron fields of Minas Gerais and on the coaling route up the coast from Santa Catarina. The river supplies some power and ample water. The market of Rio de Janeiro and central Brazil is fairly near.

South Africa also has large deposits of iron and some coal-fields. Steel making is centred at Newcastle, near the coal-field of Natal and close to Pretoria, where coal and iron are both at hand. The limiting factor is the restricted market. However, as the whole of southern Africa develops, there will be a much better market.

Australia has an important iron field in the Iron Knob district of southern Australia and some good coal-fields around Newcastle, New South Wales. Unfortunately, they are far apart. The iron ore is shipped to the coal-field to be made into steel. Again, the limiting factor to the Australian industry is the restricted market.

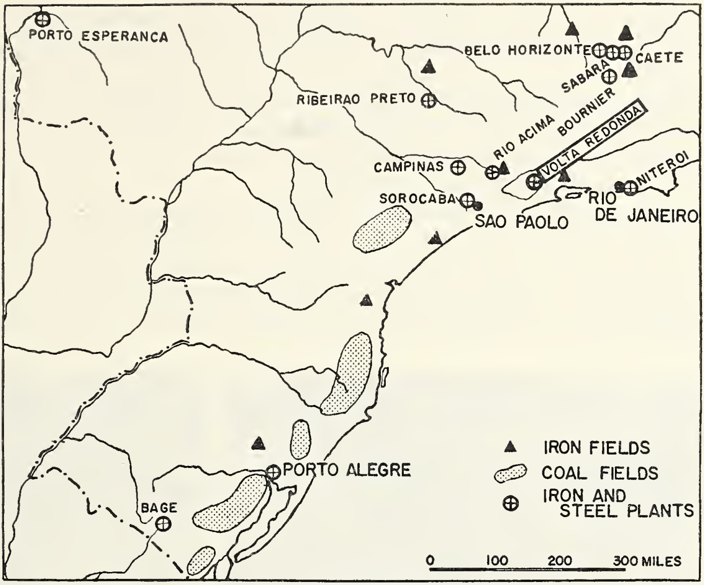


Fig. 11·8. The Brazilian iron and steel industry is the largest in the Southern Hemisphere. It is centred chiefly at Volta Redonda and uses iron from the interior plateau and coal from the southern coastal region.

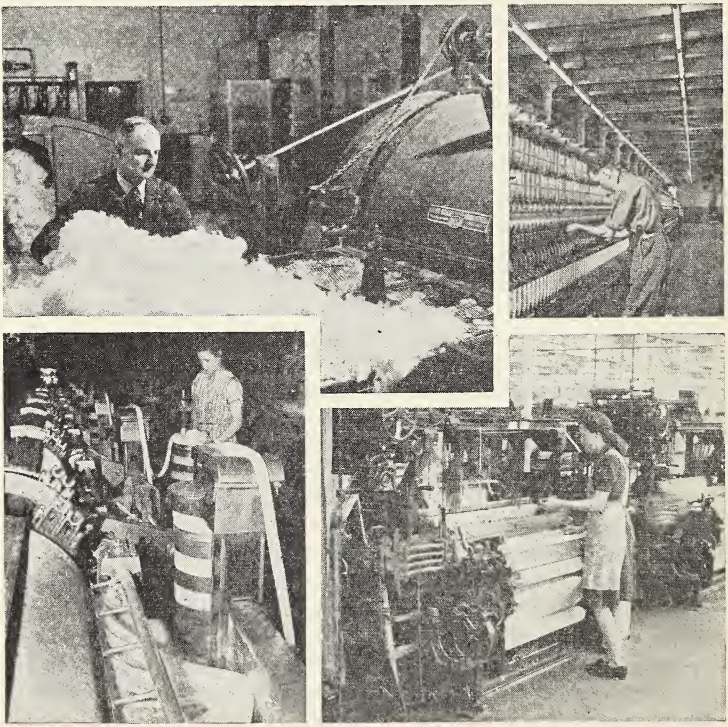
THE TEXTILE INDUSTRY

Since man changed from the wearing of skins to the use of cloth, the textile industry has been one of the most important in the world and one of the most widespread. Its geographical distribution is as general as that of civilized man. Much of it, however, is on a domestic basis and does not enter into world trade. Where cloth is made for competitive world markets, then its manufacture becomes highly localized so as to take advantage of the most suitable geographical conditions.

All fibres require a good deal of treatment before they can be manufactured into cloth. First comes the task of sorting the fibres according to length and thickness. For example, wool is sorted into carding wools for true woollen goods, combing wools for worsted goods, and low wools for carpets. Cotton is sorted in short, middle, and long staple varieties; the short type is used for industrial cloth; the middle variety, for work clothes, overalls, and camp wear; and the long, for the finer cloths in dress shirts, blouses, lingerie, dresses, and handkerchiefs.

The sorted fibres then have to pass through cleaning machines or mills that scour and wash them, taking off all fat and oil, chemicals and dirt, and making the fibre ready for use. (See Fig. 11·9.) The cleaning process requires very large quantities of water. Soft water is best; otherwise an expensive water-softening system has to be installed. Often the difference between a soft- and a hard-water area makes the difference between a textile region and one that is not.

The clean fibres are then passed through carding machines or mills. Revolving rollers with small, thin teeth "card" out the lumpy mass of fibre and gradually split it up into individual strands, more or less parallel and separate. After this, the fibres go through a more refined type of combing and eventually into drawing-machines that draw them out.



British Information Service

Fig. 11·9. Stages in the manufacture of cotton. Upper left, cleaning the raw material; lower left, carding; upper right, spinning; lower right, weaving.

(See Fig. 11·9.) Next they pass to the spinning machines that spin the individual, drawn-out fibres into continuous thread or "yarn". (See Fig. 11·9.)

These preliminary processes may all be done at the spinning factories or they may be done in several different plants, each responsible for one major step and all working together in the closest interdependence. Spinning mills often grow up at ports importing wool or cotton or at areas producing the raw materials. Then the yarn is sold to the weaving mills that finally make the cloth. (See Fig. 11·9.) These may be near the spinning mills, or they may locate themselves at the cloth-using centres, close to great markets for their products. The making of clothes and other textile goods from the cloth may take place in still another area.

A few towns carry on spinning, weaving, and the making of clothes all together, but the modern tendency is for a group of towns to specialize in one type of activity. Thus Mossley in Lancashire is a spinning town; Nelson is a weaving town; Manchester makes cotton clothes. In Canada, although Hamilton, Ontario, is a weaving centre, Toronto and Montreal make most of Canada's clothes.

The textile industry is, then, a highly specialized one where, however, the individual processes are very dependent on each other. As a result, definite textile-producing regions have grown up in the world where the basic geographic advantages are present together with a great accumulation of skill and a high degree of industrial and economic organization.

North American production is concentrated chiefly in the New England States and the southern Appalachians of the United States. New England is famous alike for its woollen and its cotton goods. The New England upland was not fit for much more than sheep; so in early days it turned to wool production. The wool was taken to towns at waterfalls near tide water where the rivers of the interior plunged down the edge of the upland to the sea. These were good sites for mills, supplying ample power and a chance of exporting the goods by water routes to other states or abroad. The seaboard position of the mill towns allowed cotton to be imported cheaply from the coastal plantations of the South, and New England soon developed a major cotton-spinning and cotton-weaving industry.

Later, although the need for wool far surpassed local supply, and although it was farther from the cotton fields than the Appalachian mills, New England continued weaving and spinning operations. This was due in large measure to industrial momentum following a "head start". However, this momentum was amplified by abundant water power and hydro electricity, by a storehouse of skills, by excellent transportation routes, both into the interior and overseas, and by close contact with the principal markets of the mid-Atlantic, north-eastern, and northern-central States.

Nevertheless, the southern Appalachians have many advantages and, after the American Civil War, made continued progress. They lie in the heart of the greatest cotton-producing region in the world. They also have a number of good power sites where, along the Fall Line, the rivers plunge from the uplands to the coastal plain over rapids and waterfalls. The successful damming of rivers in the mountains has now provided much hydro electricity as well. Although labour has not been skilled, it has been plentiful and cheap. Good access to the interior market is provided by gaps through the mountains.

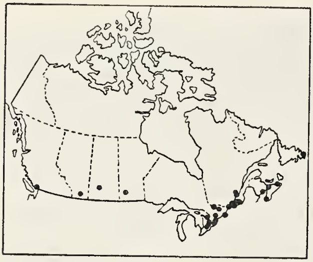
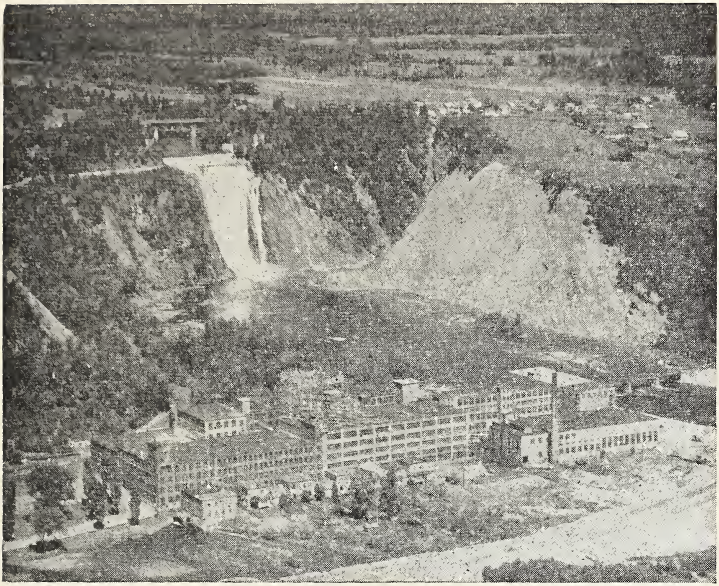


Fig. 11·10. The textile industry of Canada is concentrated very largely in the St. Lawrence-lower Great Lakes plain, close to imported cotton, close to markets, and close to an abundance of water and hydro-electric power.

Canadian textile production, (See Fig. 11·10.) long scattered, was gathered to a few nodal points during the growth of railways. The Niagara Peninsula, including Hamilton, is the chief area. It is nearest to sources of cotton in the United States; it long had a fairly good local supply of wool and may now import wool cheaply by way of the Mohawk Gap from Boston or New York. Although the industry was originally attracted by local water power, it now relies mainly on cheap and plentiful hydro electricity from Niagara Falls. It is on good rail connections with western and eastern Canada, at the heart of a well populated region. **Montreal and the Eastern Townships,** also with local wool and water power, and close to United States cotton or imported wool, on good transcontinental routes and in the middle of a populous area, are very important. The Quebec region shares somewhat similar advantages. (See Fig. 11·11.)

European production of woollen and cotton goods is very great indeed, especially because, until fairly recently, it was often the policy to discourage textile industries in European colonies in favour of the "home" countries. The colonies supplied the wool, cotton, silk, or jute, and the European nations sent out the cloth. Economically, this was a sound enough proposition (until about the time of World War I) because the colonies either did not have enough population or did not have enough population with purchasing power to warrant large-scale mechanized



National Film Board

Fig. 11·11. A textile mill at Montmorency Falls, Quebec, near cheap and plentiful water and hydro-electric power.

production of textile goods. Even though the situation changed considerably in the middle of the century, industrial momentum has kept European textiles going. If textile capacity is judged by the number of cotton spindles, Europe is well in the lead with about 58% of the world's total, made up as follows: the United Kingdom, 25%; France, 8%; Germany, 7%; the U.S.S.R., 6.5%; Italy, 4%; the rest, 7.5%.

Italy was the first notable textile producer, being famous for its cloths in the Middle Ages. It is near Egyptian cotton and Spanish wool, has much hydro-electric power from the Alps, is central to the water routes of southern Europe, controls passes into middle Europe, has a very dense population with ample labour, and possesses remarkable skill and artistic taste. Moreover, it is, along with France, one of the few areas where silk-worm culture is important outside of the Far East, and so it has a flourishing silk industry. Milan is the chief textile centre.

The Atlantic colonial powers were soon to surpass the Mediterranean. **Britain and France**, in particular, became the centres of a great triangular trade route carrying manufactured goods to the West Indies, picking up cotton there and from Louisiana and the south-east colonies, sailing thence to New England or Canada to pick up furs and forest products and so return to western Europe. Once this trade was well established the import of cotton from the Americas and the export of textile goods to the Americas became one of its most important features. Thus the cotton textile industry was born. With the expansion of empire to Africa, Asia, and Oceania, the industry rapidly expanded until it came to supply cheap clothing to masses of people all over the world. In Britain, the industry is concentrated in Lanarkshire, Scotland, and Lancashire, England, both cotton importing areas of the west coast, both on coal-fields that raise the steam power by which much machinery is driven, both with easy access to the populous parts of Britain and to overseas markets. In France, cotton comes in at the mouth of the Seine, and is distributed to plants in the lower Seine and in the industrial towns of the north-east. Rouen, Lille, Amiens, and St. Quentin are significant centres.

Belgium, Holland, and Western Germany were also well placed to import West Indian and American cotton and, later, to acquire cotton from Brazil, Africa, and India. Belgium and Germany developed active textile industries on or near their coal-fields and were successful in contacting both an overseas and a large continental industry. **Russia** was much slower in following suit, possibly because she was a good deal more remote from sources of supply. Today, however, she obtains a large part of her cotton from Russian Turkistan.

In all these countries, the woollen trade had been quite considerable even before colonial expansion, and it continued to grow. The Flemish weavers led the world in the Middle Ages, and the skills they developed still make Belgium an important woollen centre. France and Britain tried to foster their own industries in competition. Since both countries raise many sheep on their chalk "champagnes" or downs and on their heather-capped granitic uplands, they have a local resource to use. But both import great quantities. In France, the chief producing area is between Roubaix and Reims, near the north-east coal-field. In England, the industry has concentrated in the soft-water valleys near the Yorkshire coal-field in the West Riding of Yorkshire.

Asiatic textile production is found chiefly in India and Japan. **India** raises much cotton on the Deccan plateau and can import long staple varieties from Egypt. Bombay is the chief centre, near local sources of cotton and on great shipping and railway routes. The Ganges valley is growing in significance. It has a dense population, providing labour and a good market, large quantities of water, and access to coal or, to some extent, to hydro-electric power. Madras is also important.

Japan does not grow much cotton but is near Chinese sources of supply and can import Indian cotton very cheaply. With her existing skills, dense population, and far-flung mercantile connections, she has far surpassed China, though that country has much more raw cotton. Japan offers severe competition to American and European manufacturers throughout eastern and south-east Asia.

Southern Hemisphere production is not significant except in Brazil. This country grows much cotton on its drier plateaux, has considerable hydro-electric power, has a substantial home market, at least for the cheaper varieties of goods, and is well situated to serve other South American countries, east of the Andes.

QUESTIONS

A

1. Name the chief steel-manufacturing countries of the world.
2. (a) Do these correspond with the iron-producing countries? (b) Comment on their relationship with each other. (See Fig. 9·11.)

B

3. What geographical factors have enabled Hamilton, Ontario, to become the leading steel-making city in Canada? Try to make a sketch-map to help illustrate your answer.
4. Draw a map of the Great Lakes region, centred on Sault Ste Marie. Put on it the iron fields (Fig. 9·11.) and the coal-fields (Fig. 9·8.) in the Great Lakes vicinity. Show the main movements of ore down, and fuel up, the Lakes. Account for the success of Sault Ste. Marie as a steel-making centre.
5. Examine the map of the Ruhr district in Fig. 11·5. What geographical factors shown there have helped to make it a great industrial centre? Develop a sketch-map of this area to illustrate these geographical factors.
6. In terms of raw materials and markets, what has made Jamshedpur (Fig. 11·7.) one of Asia's leading iron and steel centres?
7. What are the geographical reasons for the concentration of India's textile industry at Bombay?
8. Where are the main textile centres in Canada? Why are they there?

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CHAPTER XII

Leading Industrial Regions of the World

Industrial Regions: General. The treatment of the two major heavy and light industries of the world will have shown how important geographical factors are in the location of manufacturing. In general, if raw materials are very heavy and costly to move, industry will locate where they exist, transform them to lighter, less bulky goods, and send these to the consumer. If many types of material are needed, then industry will develop at a common gathering point which may well be where the market is. If high skills are required, or plentiful labour, industry will settle where it can get these. If very large amounts of fuel or hydro-electric power are needed in manufacturing the product concerned, then raw materials are brought to the coal-field or the power centre and the finished goods sent out from there.

Of course, the closer together all these things are, the better, and, in such circumstances, industry is highly favoured and is likely to expand to a maximum. There are four areas of the world where industry has had such opportunities and where it has developed them to the maximum. These are the leading centres of the world today: western Europe, southern Russia, southern Japan, and north-eastern North America.

It will be noted that they are all in the Northern Hemisphere, where the land mass is greatest and where ocean crossings are at their shortest; they are all where there is the greatest distribution of food and of industrial raw materials; they are all in the temperate climatic zone, which is swept by cyclonic storms; and they all enjoy a fairly large to very dense population where there is a good labour supply and satisfactory home market.

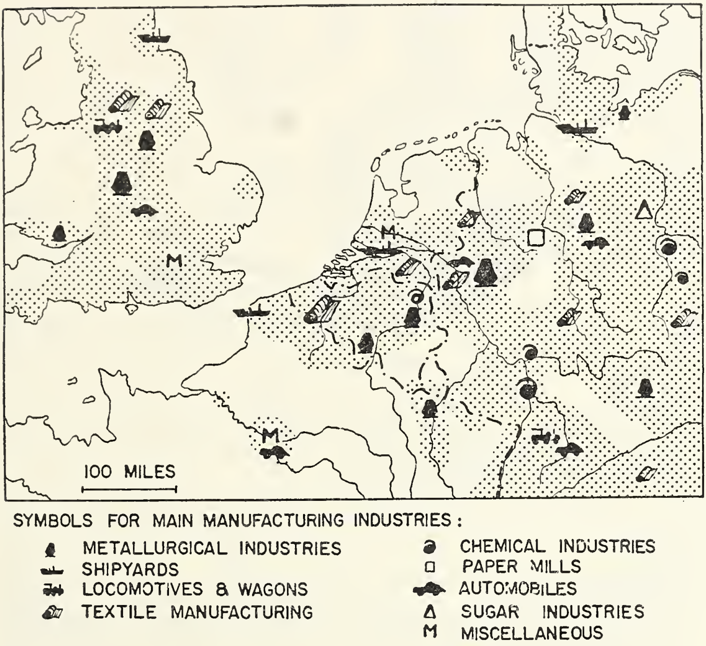

Fig. 12·1. The western European manufacturing belt.

MANUFACTURING IN THE OLD WORLD

The western European manufacturing belt is the oldest one in the world. (See Fig. 12·1.) Here the Industrial Revolution was developed in the eighteenth and early nineteenth centuries and from Europe it was carried to the Americas, Siberia, the Commonwealth, and Japan. It is characteristic of central Scotland, England and southern Wales, of northeast France, Belgium, southern Holland, western Germany, Bohemia, Switzerland, and northern Italy. It has outliers in northern Spain and southern Sweden.

The core of the region is what Griffith Taylor calls the "coal trough" of Europe; that is, the low depression between the central and the northern mountains where immense deposits of coal have been preserved. (See Fig. 12·2, page 198.) Industry concentrated on the coal-fields as steam power, raised from coal, replaced water power. Since, at that time, there

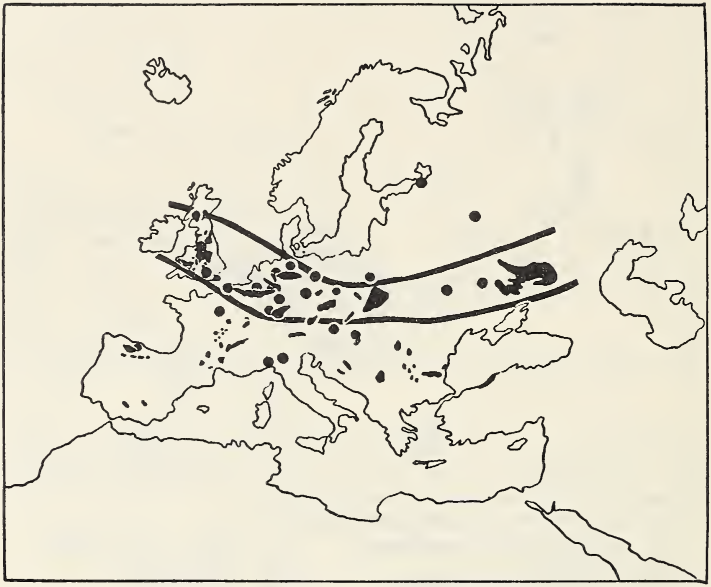

Fig. 12·2. The "coal trough" of Europe. The principal fields lie in a low trough between the Caledonian and Hercynian mountains. Note the location of Europe's principal cities in relation to the coal-fields.

was no electrical power, and oil was not used for power, there was an unusual grouping on the coal-fields such as is not found in more recently opened areas, like Canada.

The coal-fields of Scotland, eastern and midland England, north-east France, Belgium, and the Ruhr are associated with steel production, engineering, chemical, and textile industries. The Lancashire, Chemnitz, and Bohemian coal-fields are additional centres of textile production. The north Staffordshire coal-field has become the pottery centre of the world; pottery is also made at the Dresden coal-field and near the coal of northern France. The coal-fields of south Wales, central France, and northern Spain are linked with metal industries.

However, industry has also grown up independent of the coal-fields at important centres of transportation. Here coal can be assembled cheaply since no centre is very far from a coal-field. At the same time, raw materials coming into or going out of a country or region can be manufactured into consumer goods. Thus major ports such as Glasgow, London, Belfast, Le Havre, Antwerp, Rotterdam, Hamburg, Marseilles, Genoa, and Barcelona have a variety of important industries. (See Fig. 12·3.) There tends to be a specialization in shipbuilding and engineering, food preparation and textiles. Similarly, major railway junctions have developed as industrial centres, though not always on coalfields; such are Paris, Berlin, and Vienna.

Finally, there is a small group of cities which, though important as route centres and commercial foci, have had a new significance given them through the availability of hydro electricity. Cities of Austria, southern Germany, Switzerland, eastern France, and northern Italy fall in this category. They tend to specialize in wood products, engineering, and textiles.

The Russian manufacturing belt developed in the Ukraine, (See Fig. 12·4.) with the close association of coal, iron, water power, nearby oil and manganese, good ice-free ports, excellent interior river and rail connections, and a rich agriculture. An enormous wealth of coal in the Don basin, the largest Russian hydro-electric development in the Dnieper basin, the big iron fields of Krivoi Rog, Kursk, and Kerch, the Caucasian oil field not far away, the ports of Odessa, Kherson, and Rostov to feed the area, a great market in the hinterland—all make this region one of the most important industrial centres of the world. Iron

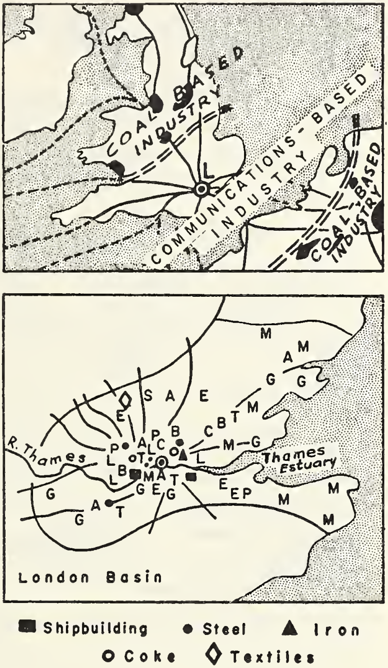

Fig. 12·3. The Greater London industrial area is not based on the presence of coal and iron, like most of the other industrial regions of Britain and of western continental Europe, but on the commanding geographical position of the area and on its remarkable development of communications. The industries are: A, agricultural machinery; B, boots and shoes; C, clothing; E, engineering; G, general services manufacturing; L, tanning leather; M, flour milling; P, paper products; T, tool-making. The wide variety of industries is typical of a centre that depends on transportation and trade rather than on fuel and raw material.

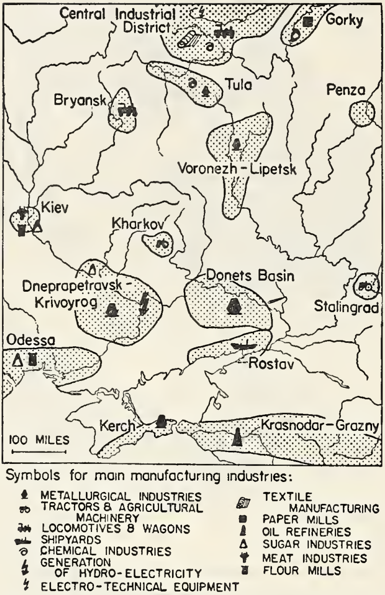

Fig. 12·4. The southern Russian manufacturing areas.

and steel and metallurgical industries are developed at Taganrog, Mariupol, Krivoi Rog, and Voroshilovgrad; alloy steel and aluminum are made with the use of great quantities of electricity at Dnepropetrovsk; transportation equipment and agricultural machinery are centred at Rostov, Kharkhov, and nearby Stalingrad; textiles and agricultural industries occur at Odessa, Poltava, and Kiev.

The Moscow region, though not so well endowed with natural resources as the Ukraine, is more central and is another important industrial area. Moscow lies near the headwaters of the Dnieper, Don, and Volga flowing south and the Dvina and Volkhov flowing north. It is the hub of a giant wheel whose spokes are the great rivers radiating out across the Russian plain. Excellent canal and rail connections have made Moscow the focus of all Russia. Fortunately, it is not far from the Tula coal-field and so has cheap fuel. Much electricity is made from the coal, and the iron deposits of Kursk are not very distant. A small iron and steel industry, large engineering works including automobile plants, and plants manufacturing electrical appliances and textiles are the chief industries.

Leningrad, the Baltic port of Russia, importing fuel and metal and other raw materials from western and northern Europe, has developed shipbuilding, other engineering works, wood products, paper, chemicals, fertilizers, and textiles.

In **India,** manufacturing grew up principally around the great British trading posts such as Calcutta, Bombay, and Madras. These were near the producing centres either of jute or of cotton and so developed large textile industries. Each port served a wide hinterland and could also import fuel and other commodities. Each has continued to flourish; Calcutta is the second largest city of the Commonwealth. It is the nearest of the three ports to the coal-producing region of the Chota Nagpur. This area is now India's main centre of heavy industry. Industry moved up the Ganges. Agricultural and textile factories are found in Dacca, (east Pakistan), Patna, Benares, Cawnpore, and Agra. Cawnpore and Lucknow are also noted for engineering and transportation equipment. Here old skills, local raw materials, a natural funnelling of routes, and dense population supply the means and incentive to manufacturing.

Japan is to East Asia what Britian is to Europe. A group of islands with considerable resources of coal and metals, agriculture and people, it is in a very favoured position for entrepôt trade, for gathering raw materials from the different climatic belts and geological structures along the Asiatic coast, and for distributing its goods over a wide, populated area. Also like Britain, it got an early start in the industrialization of the Far East, and that historical momentum has emphasized its geographical leadership.

However, its basic resources of coal and iron are not so great as those of Britain, and it is very dependent on imports, even of these fundamental commodities. What it has to rely on is its very good geographical location, its ramified trade and transportation connections, its ample labour supply, and its own peculiar business initiative and mechanical genius.

Trewartha describes the Japanese manufacturing belt, which extends from Tokyo to Nagasaki, as developing around four nodes, with tributary areas. The northernmost is the Kwanto node, centred in Tokyo and Yokohama. Here, in an area about 80 miles wide, are 7 million people, or more than there are in the 800 miles length of the Canadian manufacturing belt! That indicates, rather forcibly, the tremendous concentration of energy and population in Japan. The Kwanto district has a large supply of hydro electricity and acquires coal from nearby Joban. A good harbour, a wide, flat plain, and plentiful labour are other advantages. The chief industries are steel, machinery, transportation, oil refining, chemicals, and textiles.

Farther south along the coast is the Nagoya node, a centre of light industry, mainly textiles. A third node exists around Kobe, Kyoto, and Osaka. Power and fuel are limited, but a good harbour permits the importation of coal from northern Kyushu. A flat, densely populated plain provides good sites for factories and a large hinterland. Textiles, metal industries, machine tools, and chemicals are important. The fourth node occurs in northern Kyushu, around Yawata. It is on a large coal-field, and is near Korean and Manchurian sources of iron and the markets of the Asiatic mainland. It specializes in iron and steel and other metal industries, shipbuilding, construction products, pottery, and food preparation. The large flour mills use grain imported from Canada, Australia, and China.

MANUFACTURING IN THE NEW WORLD

The **United States'** manufacturing belt is the largest and most productive in the world. (See Fig. 12·5.) This is due chiefly to the high productivity and high per capita consumption of the people of America where industry and labour are more efficient than anywhere else. But it also results from the great resources of the country and the large trading area of the home market. The industrial belt forms a huge quadrilateral, from Boston through Detroit to Milwaukee on the north, and from Norfolk to Nashville and St. Louis on the south. Tentacles reach out to Minneapolis-St. Paul, to Des Moines, and to Kansas City in the west. Separate manufacturing regions are found around the

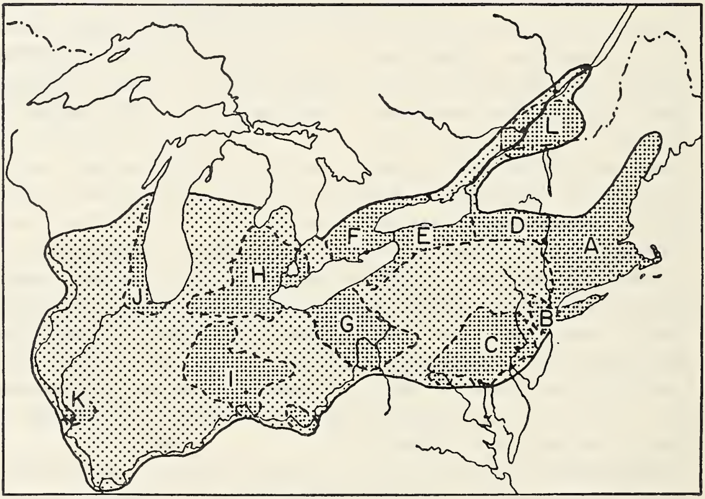

Fig. 12·5. A, New England; B, New York; C, Mid Atlantic Coast; D, Mohawk Valley; E-F, lower Great Lakes, G, Pittsburgh; H, Detroit; I, Ind-Ohio; J, Chicago; K, St. Louis; L, Montreal.

The North American manufacturing belt, the most productive in the world, includes specialization in textiles (A, L); clothing (B, D, E); footwear (A); Iron and steel (C, E, F, G, J); shipbuilding (C, L); automobiles and aircraft (E, F, H, J, L); agricultural machinery (I, L, K, F); precision instruments (A, B, C, E); pulp and paper (A, F, L); printing and publishing (B, C, F, J); fowl and meat (B, E, F, I, J, K, L); petroleum and chemical industries (B, C, E, F, L). (After White and Foscue.)

southern Appalachians, in the Houston-Fort Worth region of Texas, and on the Pacific coast in Seattle, San Francisco, and Los Angeles.

The main manufacturing belt has as its axis the Great Lakes-Mohawk-Hudson route, with New York at one end and Chicago at the other. There are four areas of concentration within the belt; these are the eastern Appalachians-mid-Atlantic coast, the Mohawk Valley-Lower Great Lakes, the western Appalachian-Ohio Valley, and the Lake Erie-Lake Michigan area. In the first, there is the dense group of cities around Boston that specializes in textiles, leather goods, fine machinery, and food preparations. Water power and subsequent hydro electricity have been the basis of the industrial activity, with coal from Pennsylvania and imported cotton and wool, cocoa, coffee, and tea. The New York group of cities is noted for food production, oil refining, the manufacturing of clothing, and for publishing, together with a great variety of chemical and engineering industries. South of it lie the cities centred in Philadelphia and lying in the Lehigh and Delaware valleys. The Delaware has been called the Ruhr of America because of the tremendous concentration of industry there with iron and steel, chemicals, oil refining, shipbuilding, and machinery of all kinds. It is near the anthracite field of eastern Pennsylvania, can get good coking-coal from western Pennsylvania, and is on the import routes of iron from Canada, iron, and oil, from Venezuela and other products. The Baltimore area may be considered its southern extension.

From Albany to Buffalo is a small but intensively developed region, on the main corridor between the Atlantic and the heartland of America. The New York Central Railway has to climb to a height of only 900 feet in passing from coast to interior. Compare this with 1400 feet for the Erie railway using the Delaware-Susquehanna gaps; or 1750 feet for the Lehigh railway; or 2000 feet for the Pennsylvania railway; or 2320 feet for the Baltimore and Ohio railway, in crossing the Appalachians. The eastern end of the Mohawk corridor has textile towns; the centre, textiles and chemicals; the western end, machinery and iron and steel. Buffalo is its chief city.

The western Appalachian-Ohio valley region is the centre of the basic iron and steel and associated machine industries of America. Here good coking-coal, some oil, and natural gas supply an abundance of fuel. Iron is imported from Lake Superior fields as a return cargo for coal moving up the Great Lakes. Huge iron and steel plants are found around Pittsburgh and Youngstown. The Ohio River cities, like Cincinnati, manufacture agricultural and other machinery.

The Lake Erie-Lake Michigan region is neither so densely settled nor so highly developed industrially as the others, but it has some extremely important specialized centres, including Cleveland, Detroit, and Chicago. Near the great iron fields of Lake Superior and the interior coal and oil fields, it has very large iron and steel works at Erie, Cleveland, and Gary; the largest automobile plants of the world at Detroit, Toledo, and Flint; and very big railway, machinery, food products, shipbuilding, and brewing industries in Chicago and Milwaukee. Farther west, the extension of the area to Minneapolis, Des Moines, and Kansas City, sees a concentration on food preparation and agricultural industries.

Latin America, not highly industrialized as yet, is principally an agricultural region or one producing the raw materials for industry. However, determined efforts are being made to develop industries wherever geographical factors are favourable. Mexico, Brazil, and Argentina have met with considerable success along certain lines.

Mexico, a country of remarkable contrasts, naturally has a varied production of goods. However, the topography has made it difficult to settle and develop all the land, and industrial growth is "spotty". The plateau and mountain rim are rich in minerals. Near Monterrey in the north are the coal-field of Sabina and the iron field of Durango. The raw materials are collected at Monterrey, the great railway hub of the north, and made into iron and steel. At the other end of the plateau lies the Mexican basin, a fairly fertile plain with a moderately dense population. Here lies Mexico City, commanding routes from the coast across the mountains into the interior. It is the centre of food, brewing, tobacco, clothing, and chemical industries.

Between Mexico City and its port at Veracruz lie the cities of Puebla and Orizaba, where availability of hydro electricity and water power has produced quite a thriving textile industry, based on the cotton raised in the surrounding valleys. Some oil refining is done at Veracruz and Tampico on the Mexican oil field, although much of the oil is exported in its crude form.

Brazil, one of the largest countries in the world and the largest Latin nation both as to area and population, has witnessed the chief industrial development in South America. However, this is small compared with North America or Europe. Several problems confront industry. Although the resources are plentiful, they are not distributed favourably. The great iron fields of the province of Minas Gerais are remote from the sea. They are far from the coal-fields of Rio Grande do Sul and Santa Catarina. Also the main sources of potential hydro-electric power are distant from the main cities which could use such power. Internal transportation is costly because the mountains rise steeply from the coast to the plateau and the main plains are on the least populated edges of the country, where they are largely under jungle. The population, though fairly large, is poor and does not have much purchasing power. Wealth has been concentrated in the hands of merchants who are not so interested in a risky venture like industry when they can get a good profit from selling raw materials abroad and importing finished articles in return.

The chief industrial areas lie around Rio de Janeiro and São Paulo, with a few isolated centres elsewhere. (See Fig. 12·6.) These two cities lie in south-eastern Brazil and have ready access to the north and the south, along the coast, and to the mineraliferous areas of the interior plateau. In their vicinity, a number of river valleys supply agricultural produce, notably sugar, coffee, rice, and oranges. They have a fairly dense population. A close net of railways has been built, and trans-

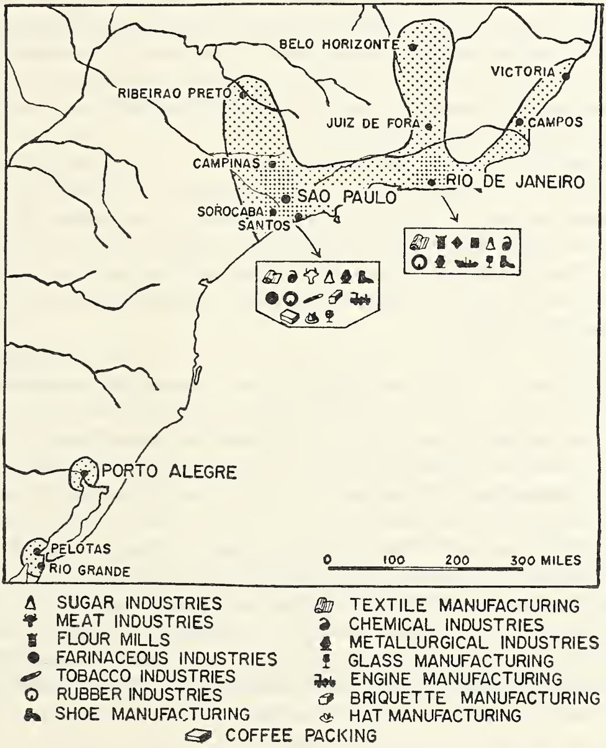

Fig. 12.6. The Brazilian manufacturing belt and diversity of products. (After Direction de la Documentation.)

portation, both internal and overseas is excellent. Around the capital are cotton, woollen, and jute mills, foundries, oil and sugar refineries, and factories preparing foodstuffs. São Paulo is noted for its textiles, leather, clothing, and machine industries. Reference has been made to the steel mills at Volto Redonda in the Paraiba valley.

Argentina has few major industrial resources apart from its rich agriculture. There is very little coal, oil, or iron in the state, and hydro-electric sites in the western mountains are remote from the eastern seaboard. Actually Argentina has been in the habit of importing English coal in return for the export of Argentinian beef and wheat, and has used this coal for its industries. These are chiefly flour-milling, meat-packing, sugar-refining, and the making of leather goods. But textiles are increasing in importance. Most industries are located at Buenos Aires on the estuary of the La Plata, and at Rosario, Sante Fé, and Bahia Blanca.

The Canadian Manufacturing Belt. The Canadian manufacturing belt has many advantages. These have, in their time, attracted various types of industry, each type seeking and developing its own particular vantage ground. (See Fig. 12.5.)

Because of its position between the iron of Lake Superior and the coal of Pennsylvania, the region had an opportunity to start a **steel industry**. This has been further facilitated by the cheap transportation offered by the Great Lakes. Later, the belt's nearness to the nickel and iron deposits of the Canadian Shield confirmed it in its position, and many types of nickel-hardened and other high alloy steels are made, chiefly at Hamilton and Sault Ste Marie.

Relatively cheap steel has been the basis of a whole range of steel-using industries. The most important are those making **transportation equipment**. In a wide country like Canada, transportation plays a vital role. The building of canal ships, lake boats, and ocean liners—to make use of the Great Lakes-St. Lawrence system and of the Atlantic and Pacific trading areas—absorbs much steel; so does the making of rails and rolling stock for the railroads, the manufacture of automobiles, and the production of aircraft. Since southern Ontario and western Quebec are at the hub of the nation's transportation, it is not unnatural that they should produce so much of its carrying equipment. Important centres are Windsor, St. Catharines, Hamilton, Oakville, and Oshawa for automobiles or auto parts; Toronto, Montreal, and Sorel for shipbuilding; Toronto and Montreal for aircraft; Welland for electro-metallurgical products; Hamilton and Montreal for bridges; and Montreal for rolling stock.

Mining equipment (drills, elevators, crushing mills, screens, and ore carriers) developed in close conjunction with the steel industry. It was needed to open up the mining country in northern Ontario and Quebec, so close to the manufacturing belt. Similarly, **agricultural machinery**, also dependent on steel, became important because of the rich agricultural plains in southern Ontario and Quebec, and accessibility to the Prairies and export markets. Good supplies of wood in the mixed hardwood forests of the Lower Great Lakes-St. Lawrence Lowlands also helped. Brantford, Hamilton, and Toronto, all in the province of Ontario, are principal centres.

The manufacture of **electrical appliances**, likewise dependent on the metal-making industries, grew to significance in the region due to the cheap electricity developed there and the wide use of electric power in an area without coal or oil. Many other steel-using plants have grown in a third stage of expansion to supply parts to the transportation, mining, agricultural machines, and electrical industries. St. Catharines, Hamilton, Toronto, and Montreal are especially significant.

The **forest products** of Ontario and Quebec have long been valuable. With the dense forests of the Shield, cheap hydro electricity, and an immense market in the United States, pulp and paper milling has become a major industry. It is found mostly along the edge of the Shield, as at Quebec, Three Rivers, Hull, and Ottawa. However, at St. Catharines and Thorold there are large paper mills due to the water power generated by the locks of the Welland Canal and more recently to the hydro electricity developed at Niagara Falls and at Beaverdam. These plants are advantageously placed for sending their products by the Great Lakes to Chicago or by the Erie Canal or the New York Central Railway to New York.

Textile manufacturing started with the good supply of wool from the sheep farms of the hilly lands bordering the region. Later, flax was grown and added another raw material to the industry, while cotton was available at no great distance from the southern states. (It must be remembered that southern Ontario is as near to the Carolinas as is New England.) With cheap electricity available in great quantities, the industry has continued to expand. Backed by tradition and skill, it has gone on to new ventures by making rayon (exploiting its nearness to the forests of the Shield) and nylon (using its contacts with the coal-fields of Pennsylvania). St. Catharines, Hamilton, Montreal, and Sherbrooke are leading centres.

The importance of **food preparations** springs from the climatic situation of the region, a cool temperate area but with distinctly warm summers favouring orchards and vegetables; that is, canning crops. Flour milling is still significant, though it no longer relies, to any great extent, on local raw materials. But there *are* local advantages. The manufacturing belt is the chief market in Canada for flour, and here the making of flour had a head start on the West. Industrial momentum has kept it in the lead ever since.

The **chemical industry** has grown tremendously. This is not because of local chemicals except for the salts of the Sarnia region; most supplies have had to be imported. But there is ample water and cheap electricity, usually a necessity in the processes involving chemical solutions and reactions. Above all, there is the great demand for acids, high-test refined petroleum, food preservatives, chemicals to de-fat and clean textiles, to dye textiles and paper products, and to paint all kinds of machines. Moreover, the whole range of plastics, due to modern chemistry, is much in demand in other industries and by the consumer public. The refining of petroleum is carried on at Sarnia, at points near Toronto, and at Montreal. Other chemical industries operate at Hamilton, Toronto, and Montreal.

From this brief survey it will be seen that the geography of industry is of prime importance in any description of the earth and that it results from a number of physical advantages in the environment and from the way in which they are used.

QUESTIONS

A

1. Identify and list the towns for which the various industrial symbols have been drawn in Fig. 12·1.
2. Transportation centres tend to gather many industries. Identify the industries of the London region as shown in Fig. 12·3.

B

3. Which are the chief steel, automobile, shipbuilding, textile towns of W. Europe?
4. List the main industrial cities and regions of Russia and account for the kind of industry for which each is most famous. (See Fig. 12·4, page 200.)
5. Trace the map in Fig. 12·5; put on it the cities of 500,000, or more, population (as shown on a school atlas); and place against each a symbol representing the industry for which it or its region is famous.
6. Account for the location of the following industries within the Canadian manufacturing belt: transportation equipment, agricultural machinery, food preparations, oil refining, chemicals.
7. Compare and contrast the geographical factors supporting the rise of Britain and Japan as great industrial nations.

C

8. Estimate the comparative merits of the countries of the Northern and of the Southern Hemispheres as industrial nations.

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CHAPTER XIII

Geography and Transportation

The Importance of Transportation. It has been said, "La route crée la vie." Routes certainly affect life. If they are direct, relatively short, and cheap, they quicken communication, assist in developing an exchange economy, lead to racial, social, and cultural contact and penetration, and produce a stimulating environment in which population tends to grow. The junctions of routes become the hubs of economic development, the foci of racial and cultural fusion, and the centres of political power. Most of the great capitals are at such centres; for example, London, Paris, Berlin, and Moscow, and the countries grow up around them accordingly.

If, on the other hand, routes are few and far between, attenuated and costly, then people do not move so much. They do not have the same tendency to exchange their goods and services. They see each other less frequently, are more self-contained and isolationist, and resist other cultures or practices to a great extent.

The availability of routes *between* nations helps their trade a great deal and should tend to bring them close. The density and arrangement of routes *within* a country has much to do with bringing and keeping its several parts together. The unity of Canada, for instance, is very largely the unity of its routes. (See Fig. 13·1.) Physiographically, the Atlantic provinces are separated from the central provinces by the Appalachians; the central ones, from the Prairies by the Shield; and the Prairie provinces, from the Pacific coast by the Rockies. The rivers and railways, however, which run across the major barriers, keep people together and have done a good deal to strengthen Confederation. Gradually regional differences are breaking down and a more united way of life is growing up through the use of our routes and communications.

Thus national unity and strength, and international trade and co-operation are very dependent on routes, and it may be said that they

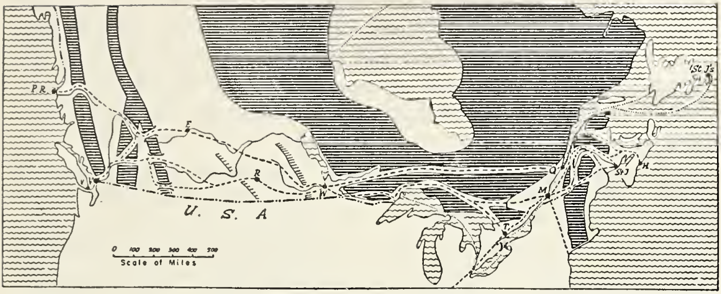


Fig. 13·1. PR, Prince Rupert; V, Vancouver; E, Edmonton; R, Regina; W, Winnipeg; T, Toronto; M, Montreal; Q, Quebec City; St. J, Saint John; H, Halifax; St. J's, St. Johns.

The unity of Canada is the unity of its routes. Whereas the Coast, the Columbia River and the Rocky Mountains separate the Pacific and the interior; the Skeena, Fraser and Saskatchewan rivers, with the passes they make and the railways that follow them, join these regions. The Canadian Shield divides the Prairies from the plain of the St. Lawrence and the Great Lakes, but the Rainy and St. Lawrence rivers, the Great Lakes and the railways that follow them help to bring these lowlands together. Finally, the Appalachian Mountains separate the Central Provinces from the Maritimes, but the Temiscouata-Saint John valley, the Matapedia pass, the railways following them, and the sea routes of the St. Lawrence estuary and gulf, link these parts of Canada together.

have grown historically where routes have extended geographically. As the Roman Empire owed much to its marvellous system of roads, so the Commonwealth does today to its sea-lanes and airways.

Since so much of the cost or profit of a business may be involved in bringing goods together and sending them radiating out, industry, wholesale and retail trading, and financial services try to command the best routes and the best access to them. Schools and homes, on the other hand, which have children to consider, try to avoid busy trunk routes. Thus different interests have different reactions to routes. In this way, the pattern of main and tributary routes in a community is a prime factor in creating the pattern of settlement there, in separating industrial, business, and residential areas.

Various kinds of routes develop various specializations. This is very obvious when one looks at the location of ports, where land routes from the interior converge on sea routes fanning out abroad, as at Montreal and Vancouver. Similarly, in the interior, a natural gathering together of railway routes will build up a major commercial centre, like Winnipeg. At points where there is a break in transporting goods, and where one type of route gives way to another, "handling" centres grow up, as where goods leave a seaport for a canal, or leave a canal for a railway. Many such towns have sprung up along the St. Lawrence and Great Lakes where natural breaks have forced such transfers; for example, Port Arthur and Fort William. Where routes pass through narrow gaps between surrounding uplands, they may be very important from a military point of view, and defence settlements, like Quebec City, emerge. Many defence cities of this kind are situated on either side of the Alps.

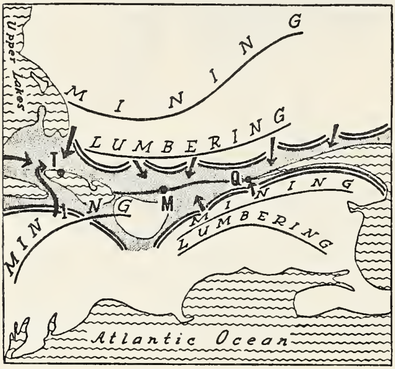


Fig. 13·2. Diagrammatic sketch-map showing the convergence of land forms, routes, and economies in the central province and the rise of industrial-commercial metropoli. The Shield from the north, and the Appalachians, from the south, converge on the fertile St. Lawrence lowland. Mining, lumbering, and agriculture are thus brought into juxtaposition, and trade and manufacturing have been stimulated at Toronto, Montreal, and Quebec.

Of course, it must be realized that just as settlements are controlled by routes, so these in their turn are controlled by topography, climate, and the availability of natural resources. The structure of the continents is very significant in this respect. Where the structure is such as to bring major natural regions together, there is an incentive to competition and commerce in the zone of convergence. (See Fig. 13·2.) Thus, in Canada, continental structures have brought crystalline uplands, sedimentary lowlands, and fold mountains together along the lower Great Lakes-St. Lawrence plain. This has stimulated specialization in each area on its own particular products, the building of a dense network of canals, roads, and railways, and the growth of industry and trade. Ideas and materials have been easily diffused. Enterprises have been both competitive and interdependent. This has increased inventiveness, initiative, and co-operation. Consequently, a great variety of occupations, activities, and products, and a high standard of living have developed.

THE LAND ROUTES OF THE WORLD

Land routes are the oldest and still the most travelled routes of the world. In ancient times, the world was very much a land community and most of its trade was overland. In general, land routes follow the most direct path between one place and another. However, **linear** distance is always qualified by **cost** distance. It may take a longer time and, therefore, cost more to go by a direct but mountainous route than to take a roundabout way. Thus in hilly land, routes follow the line of lowest gradient and wind about in such a way as to make traffic easy.

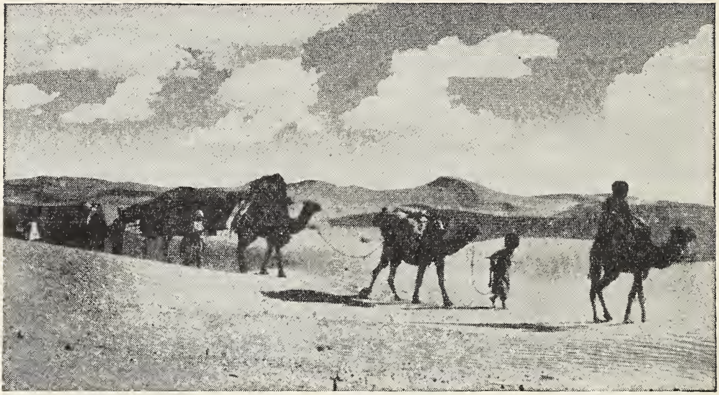
Land routes are deflected from their direct path, not only by steep inclines and high altitudes, but also by swamps, by the likelihood of periodic floods or snow blockages, by the frequency of tornadoes or of dust storms, by uninhabited desert or cold areas, by dense jungles, or by the absence of economic resources. Human factors, too, may deflect routes as, for instance, political boundaries, areas of social unrest, areas of banditry, strong racial or cultural prejudices, and social influence.

Travel by Trail. Land routes also vary according to the means of transportation used. Simple means use trails rather than roads. In Eastern Asia, **coolies** carry loads on their backs or in panniers strung at the end of a pole borne across the shoulders. They are able to take narrow trails up and down steep slopes in mountainous country where wheeled traffic would be impossible. Human carriage is still very common in tropical lands, especially in densely populated areas where the tradition of human labour is ancient and strong. It is also practised by primitive peoples who have not domesticated pack animals nor made machines.

Pack animals are widely used in Asia, Europe, and Latin America for local traffic between villages and market towns in hilly districts, where it is hard to build anything more than mountain trails. Donkeys and mules are especially favoured for the purpose.

Travel by Caravan. A rather special case of travel by trail is the use of camels in desert caravans. (See Fig. 13·3, page 214.) It is difficult and costly to maintain roads for wheeled traffic through deserts, particularly in those that have a wide expanse of wind-blown dunes. But fairly well defined trails can pass through: they are easily shifted if dunes cover one part, require no expensive upkeep, and are quite satisfactory for the big pad-like feet of camels and dromedaries. These large animals can carry a considerable weight, and are accustomed to going long distances without water. They are thus ideal for crossing deserts. Strung together, head to tail, in long, winding lines they can carry large quantities of goods a great distance. Caravan routes are very important in the trade of Mongolia, Chinese and Russian Turkistan, parts of Pakistan, Iran, Arabia, and North Africa. Camel caravans were successfully introduced to Australia, but have been displaced. They are not common elsewhere.

Travel by Road. Because they provide more efficient transportation, wheeled vehicles have tended to replace human or animal carriage wherever feasible. Their use has, of course, entailed the building and upkeep of roads. To begin with, these were as short as possible and were often constructed to supplement rivers, connecting one navigable



Ewing Galloway

Fig. 13·3. A camel caravan in the Turkistan desert. It is almost impossible to make roads through the shifting desert sands, but caravans are free to alter their trails and so can traverse the desert.

stream with another or affording a **portage** around rapids. Such were the first roads in Canada, like the Niagara Portage. (See Fig. 13·4.)

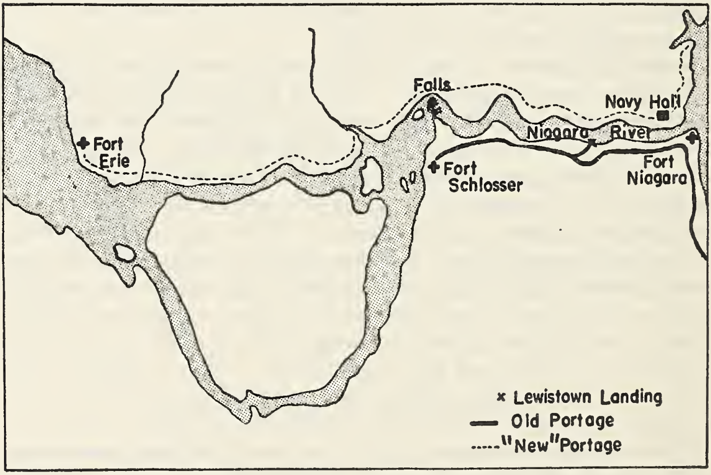


Fig. 13·4. The Niagara Portage. The British and French used rivers as their chief routes in colonial days. Most roads consisted of portages linking navigable sections of rivers around waterfalls and rapids. This was the case with the Niagara portage, circumventing Niagara Falls. The old portage was built just before the American Revolution, and the new one just after it.

Gradually, however, as stage coaches, using relays of horses or mules, provided comparatively rapid passenger traffic, **staging routes** were built along the side of lake or river. They offered competition to water routes and were favoured for travel and the transportation of light, valuable goods. Staging routes soon connected Montreal, Toronto, Hamilton, and Windsor. From Toronto, they went north to Georgian Bay. From Hamilton, they struck out to Goderich on Lake Huron and to Port Dover on Lake Erie.

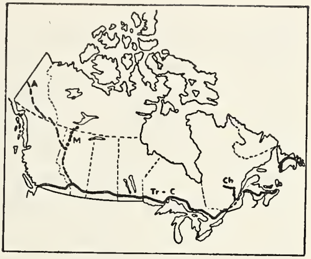
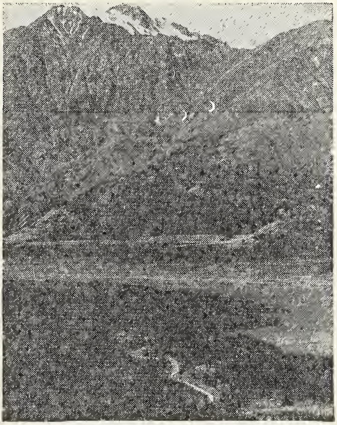


Fig. 13·5. The Trans-Canada highway provides road transportation from coast to coast. Highways are springing up in the north, where the Alaska (A), Mackenzie (M), and Chibougamau (Ch) highways have helped open up the country.

With the coming of the railway, roads lost some importance though they maintained significance for local and for fast moving traffic. In the last two decades however, the building of **trunk roads** for trucking purposes and for long distance bus travel has given roads a new value. Trucks can load directly at the factory and unload at the warehouse or store, thus saving the handling delays involved in using the railways. Nation-wide nets of trunk roads have been developed in most countries. The Trans-Canada Highway (See Fig. 13·5.) is an artery of trade for those provinces which have built their sections of it. The Ontario Highway No. 2 that runs from Windsor through Toronto and Hamilton to Montreal is the axis of Canada's industrial belt, joining the chief gateway into the continental interior with the chief ocean gateway.



Canadian Government Travel Bureau

Fig. 13·6. The Alaska Highway was built essentially as a strategic road to link Alaska with continental America. Though most of the country through which it passes is wild and rough, some of it has valuable minerals and good timber and is attracting settlement by the side of the road.

In a rapidly developing country, like Canada, roads can be built into pioneer territory more cheaply and quickly than railways, (See Fig. 13·6.) and so there are northern extensions of our highways reaching deep into the northwest. The most important of these are the Alaska Highway from Edmonton to Whitehorse, and the Mackenzie Highway from the railhead in Alberta to Great Slave Lake. A "winter" road built on snow and ice extends the Mackenzie Highway over the western arms of the lake to Yellowknife.

The road network is very dense in north-eastern North America, western and central Europe, and Japan; and fairly extensive in northern India, Java, and parts of Brazil, Uruguay, and Argentina; Cape Colony, New South Wales, and New Zealand. It enables industry and trade to develop with the greatest ease and intensity in these areas.

Travel by Rail. The total railway mileage of the world is approximately 750,000. Of this, the Americas have approximately 383,000; Europe, 236,000; Asia, 75,000; Africa, 32,000; and Australasia, 24,000. The United States alone has over 250,000 miles. (See Fig. 13·7.)

The length of the railway is not the only important factor, however. The density of the rail net is also important. Thus Belgium with 8.59 miles of line for every 100 square miles of territory has a much denser net than the United States, with an average density of 1.03 miles per 100 square miles. Only in the mid-Atlantic coastal plain would the United States approximate the density of western European lines.

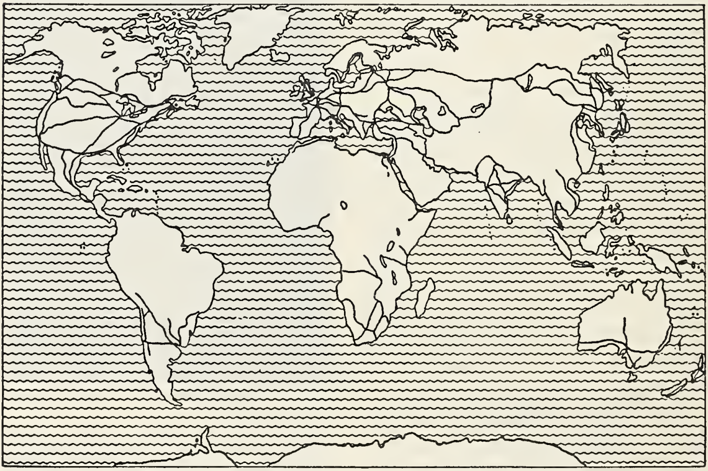


Fig. 13·7. The distribution of the main railways of the world shows dense networks in western Europe and eastern North America, with a fairly dense web in Russia, Manchuria, Japan, and India in the Northern Hemisphere, and Argentina, Uruguay, and southern Brazil in the Southern Hemisphere.

Distance from a railway is today one of the chief criteria of the industrial development and potential of a country. Few countries in western, central, or southern Europe have any parts farther than 50 miles from a railway. The same is true of eastern North America, except for the Appalachians and the Shield. Southern Japan, the Indo-Gangetic plain of India, the São Paulo-Rio de Janeiro region of Brazil, and the Buenos Aires region of Argentina have similar densities. The American mid-West, Canadian Prairies, Russia, parts of South Africa and Australia have a fairly dense railway net. Beyond the areas mentioned, however, there is a low density of railways, and transportation is more costly and less frequent.

Railways are useful chiefly in carrying material in bulk over considerable distances and in taking a large number of passengers quickly and cheaply. In Europe, many very fast local trains carry commuters to and from their daily work. This practice is less common in North America where people customarily drive to work in their own cars, but it happens in the large cities, if parking problems are serious. The railway is particularly valuable in a country like Canada with such an immense breadth, where passengers and goods may be carried thousands of miles without changing vehicles.

Trains are very sensitive to slope, their load-carrying capacity being cut down considerably for relatively small increases in gradient. Thus, it has been calculated that an engine pulling a trainload on the level at a given speed could pull only half the load on a slope of 1/500, one-seventh the load on a slope of 1/100, and about one-twentieth of the load on a slope of 1/40, beyond which it is rarely economic to operate. Gradients of 1/100 occur frequently in hilly districts. Here, trains drop speed or take on a second engine.

Because of these facts, railroad lines—if they are to be profitable—have to follow topographical controls very carefully. Fortunately, in the case of Canada, although there are major barriers like the Appalachians, Shield, and Rockies, important east-west or west-east flowing rivers have cut deeply into the mountainous masses and provide fairly easy routes from coast to coast. The problems of snow blockage in the coast and Rocky Ranges, of periodic floods in the Fraser delta, Red River Valley, and the Lower St. Lawrence are, however, very real.

The railway net avoids the very dry parts and is denser on the humid parts of the Prairies. In southern Ontario, it widens out to avoid swamps, which are the relics of glacial times, and then grows denser on the better drained till or post-glacial beaches and terraces.

Railway building in Canada commenced during the forties and fifties of last century; there was a great boom in the sixties, when most of eastern Canada had reasonable rail connections. In the eighties, another railway boom spread the mesh of glistening steel rails over the Prairies and carried them to the Pacific. The main effort was an east-west movement. Later, railways were pushed to the north, into the mining regions of northern Ontario or Quebec and into the Peace River agricultural area. Today, construction is once again active, this time well into the north, in northern Manitoba and Labrador. A gradual consolidation of various railway companies and lines took place, leaving two major systems, the Canadian Pacific Railway and the Canadian National Railway. Railways have helped considerably in Canada's development.

The Canadian Pacific (See Fig. 13·8.) transcontinental line begins at Saint John, New Brunswick, passes near Fredericton, cuts across northern Maine, and continues across the southern Cantons to Montreal, thus making the shortest run from the Atlantic over the Appalachians to the St. Lawrence plain. Thence it follows the Ottawa valley, the old Mattawa portage, and Lake Nipissing to Sudbury. It swings north-

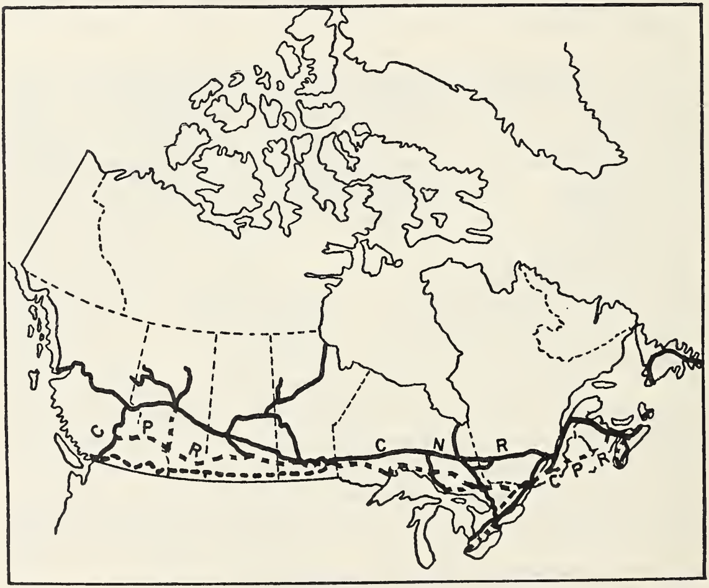
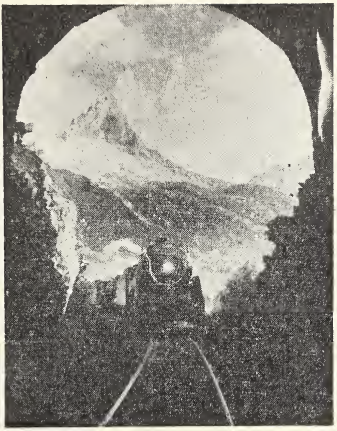


Fig. 13·8. The main routes of Canada's two transcontinental railway systems, the Canadian National and the Canadian Pacific railroads.

west, heading directly for the north shore of Lake Superior and Fort William.

There it continues on what is roughly the height of land between Rainy River and English River and so debouches on the Prairies to enter Winnipeg. There it sends two main lines out, one up the Brandon re-entrant across the Manitoba scarp to Regina, so to Medicine Hat, Calgary, and the Kicking Horse Pass; the other along the south fringe of the Prairies to Lethbridge and the Crowsnest Pass. These famous passes carry the lines across the Rockies. (See Fig. 13·9.) Then the northern line, reaching the South Thompson River, heads for Kamloops and so follows the Fraser River to Vancouver. The southern line has a much more tortuous route, using sections of the Kootenay, Columbia, and Okanagan valleys in order to find its way to Vancouver.



Canadian Pacific Railways

Fig. 13·9. A powerful engine is needed to pull trains through the Canadian Rockies. Railways follow valley terraces and passes as far as possible, but sometimes pass through long tunnels to get through rocky spurs.

Major branch lines are from Montreal and Ottawa to Toronto and thence to London and Windsor, from Toronto via Georgian Bay to Lake Nipissing, and from Winnipeg and Regina to Edmonton.

The Canadian National transcontinental line (See Fig. 13·8.) begins at Halifax, proceeds through Moncton, the Bay of Chaleur, and the Matapedia pass to Rimouski and Levis. Thence two lines swing through the Cantons to Montreal. One continues along the St. Lawrence and Ontario shore to Toronto and Hamilton, climbs the Dundas re-entrant, passes on to London, and diverges then to Windsor and Sarnia. Another goes from Montreal to Ottawa, follows the Ottawa-Mattawa-Nipissing depression to Sudbury, and then crosses the height of land to the Clay Belt at Hearst. Here it joins the main transcontinental line from Quebec to the Clay Belt through Cochrane. The route then goes north of Lake Nipigon to Winnipeg, runs along the north fringe of the Prairies by Saskatoon to Edmonton, crosses the Rockies in the Yellowhead Pass, finds the North Thompson River to Kamloops, and thence takes the Fraser to Vancouver. Also from Yellowhead Pass, a major spur line follows the upper Fraser River to Prince George and then the Skeena

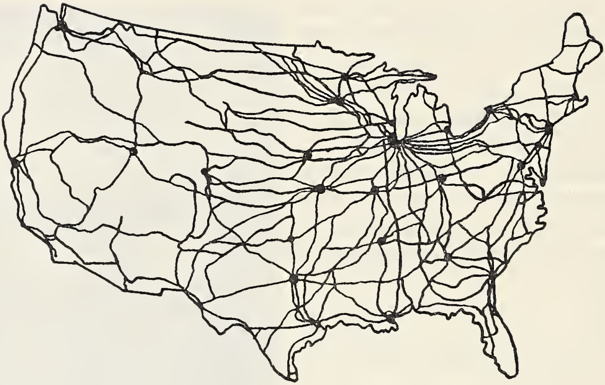


Fig. 13·10. The railway web in the United States, as made up by the main railway routes. Notice the areas of relative sparseness or density of routes.

River to Prince Rupert. From Winnipeg, a southern branch runs to Brandon, Regina, and Calgary, through the heart of the Prairies.

United States' railways cover the country very adequately. They account for one third of the mileage of the world. Beginning with the great Atlantic ports of Boston, New York, Philadelphia, and Baltimore, they radiate out across gaps in the Appalachians to mid-western centres such as Chicago, St. Louis, Kansas City, and New Orleans. Here the so-called "transcontinental" lines cross the Great Plains, wend their way through the western passes to the Pacific terminals of Seattle, San Francisco, and Los Angeles. (See Fig. 13·10.) Several north-south lines connect New York and Chicago with the cities of the Gulf of Mexico and connect the Atlantic coast settlements with one another. New York and Chicago are among the greatest railway terminals and junctions in the world.

European railways are very dense in Britain, the Low Countries, Germany, southern Sweden, France, Austria, Switzerland, and northern Italy; but thin out to a distinctly more open pattern in the northern and southern extremities and eastward into Russia. The systems were built essentially as national patterns, and their prime purpose has been to unite the borders of a country to its capital. Therefore, the rail net in Europe consists of a series of radial patterns, very dense at their heart, and interlocking on their edges. (See Fig. 13·11.) This explains what may seem to be excessive centralization. Thus to travel from Oxford to Cambridge, it may be more convenient to go up to and down from

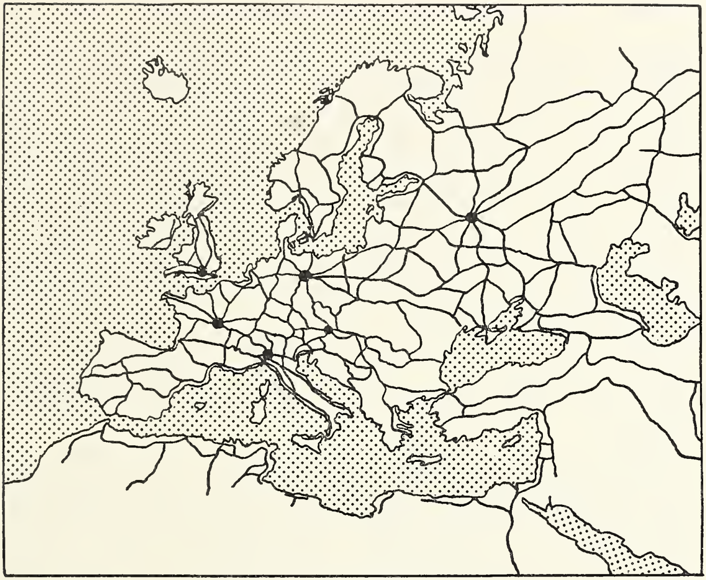


Fig. 13·11. The railway network in Europe is the densest in the world. Few places are more than fifty miles from a railway line. Note how the web of lines is centred in national systems radiating from national capitals or from major cities.

London. No important railway in Britain fails to start out from London, the London and North Eastern going to Edinburgh and Aberdeen by the east coast, the London Midland and Scottish railway going to Glasgow and Edinburgh by Leeds, and the Great Western going to Manchester by Birmingham. The Southern Railway runs from London to Dover, or London to Southampton.

Similarly, Paris sees a star-like radiation of lines to Calais, Le Havre, Cherbourg, and Brest in the north, to Bordeaux in the south-west, and Marseilles via Lyons in the south-east. Berlin and Vienna are other great hubs from which lines thrust out like spokes of a wheel.

The connection of several national systems along main axial routes has provided transcontinental lines. Thus the Oriental mail line runs from London by the Harwich-Flushing ferry up the Rhine to Basle, passes through the St. Gothard tunnel, and thence, by Milan, goes to Brindisi, where it picks up mail boats going to India and Australasia. The mail route to Russia goes from London across to Berlin by the Rhine-mouth ferry and thence continues through Warsaw to Leningrad or Moscow. The Orient Express goes from London to Paris via the Dover ferry, and then crosses to Vienna and the Danube lands to Istanbul. A branch goes through the Vardar corridor to Salonika.

The Russian and Siberian systems, though very open, are very extensive, and the U.S.S.R. has the next greatest mileage after the United States. The three main terminals in the west are Murmansk, Leningrad, and Odessa. From these points, the routes go into Moscow. Then they radiate out to Trans-Caucasia, to the Tashkent region, and Russian Turkistan. The most famous line is the Trans-Siberian Railway which, beginning at Moscow, climbs through a low pass in the Urals at Sverdlovsk and then traverses western Siberia making for the gap between the mountains of central Asia and the rim of the Siberian Shield. Here at Irkutsk it has a more straitened course, finds the Amur, and so descends to Vladivostok. A parallel line further north has been projected so that Russia's east-west connections will not be dependent on one railroad.

In **Asia,** the country with the largest mileage is India. An excellent system of railways links Madras, Bombay, Delhi, and Calcutta in the north, taking advantage of the great river valleys across or around the Deccan plateau. In China there is the Manchurian railway system, linking the Trans-Siberian railway to its out-port at Darien and also with the Peking-Pukow-Canton railway in China. An east-west line from Haichow to Sianfu and Lanchow also exists. Chinese lines complement and feed into the rivers—the real arteries of trade. Japan has a dense network of short lines, mainly on its southern islands, linking up the ports and inland cities of its manufacturing belt.

South American railways feed the great ports of Buenos Aires, Montevideo, Santos, and Rio de Janeiro. Again, river-borne traffic is very important, especially up the Paraguay and Amazon Rivers. Only three railways cross the Andes: it is such a high, unbroken range. They run from Buenos Aires to Chile and Peru.

In **Africa,** there has long been a dream of a Cape-to-Cairo railway, but it is far from completed. The Union of South Africa and French North Africa have reasonably good rail connections, but the rest of the continent is still rather inadequately served.

Australia possesses a system that links most areas with each other by following the periphery of the country from Perth to Melbourne to Sydney and to Brisbane. A transcontinental line from Adelaide to Darwin is projected. The great interior desert is a major barrier, however, to railway construction. The fact that each state built its own railways and that most of them adopted a different gauge from the others has also presented problems.

THE WATER ROUTES OF THE WORLD

Transportation by water has long been of service to man because of its ease and cheapness. The rivers, lakes, and seas are ready-made paths, and the only requirement for their use is to build harbours at strategic locations on their borders. This cuts down overhead expenses enormously. Furthermore, there is not usually the wear and tear on boats that land vehicles suffer, and since water provides less friction against movement than land, boats can travel on less fuel.

However, there are drawbacks. Since boats travel very slowly compared with trains or trucks, they are not used when time is an overriding factor. Thus, although boats can carry mail from Leningrad to London, or from Brindisi to London more cheaply than trains, the mail—which demands prompt delivery—travels by train. Similarly, although it would be cheaper to send mail by boat from Montreal to Port Arthur, the mail actually goes by train to save time. On the other hand, wheat uses boats from Port Arthur to Montreal when the waterway is free of ice, because wheat can keep, and low price, rather than speed, usually determines the method of transporting bulk cargoes.

Certain hazards do exist on water routes. On rivers, the water level may rise or fall with the rainfall. The water level falls so low on the Mackenzie in late summer that it often impedes traffic. Shoals, shifting about from one flood season to another, also endanger trade or force the marking of new channels. Dredging is required all the time on the St. Lawrence between Montreal and Three Rivers to prevent shoals forming. On the ocean, a contrary current may slow up boats. Storms frequently cause damage or delay. The difficulty of entering or leaving ports with a high tidal range or ports with too shallow a draught also has to be overcome. Nevertheless, water navigation carries an enormous tonnage of interior and of intercontinental trade.

Inland Water Routes. To the Indians of Canada, their rivers were their roads. They used them to canoe up and down in summer and to travel on by sled during the winter. Fortunately, the immense waterways of the St. Lawrence-Ottawa-Great Lakes-Rainy River-Lake of the Woods, Lake Winnipeg-Red River-Assiniboine, Lake Winnipeg-Saskatchewan River, Athabaska River-Mackenzie River, and the Thompson-Fraser River, all provided excellent natural highways. The St. Lawrence-Great Lakes, Mackenzie and Lower Fraser are still used today. The St. Lawrence-Great Lakes system is one of the largest and most important waterways of the world.

Canadian-American Canals. (See Fig. 13·12, page 224.) Most of these rivers are interrupted by spurs of the Canadian Shield or by

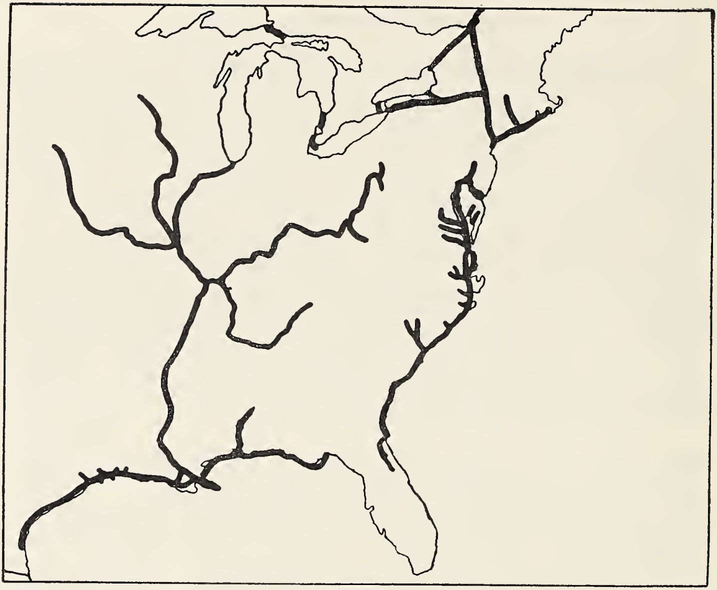


Fig. 13·12 The major navigable rivers and canals of the United States and Canada.

mountains or other obstructions. The Indians had to make portages around the rapids; the European settlers built canals. The St. Lawrence waterway has many canals including the Lachine canal on the Island of Montreal, by-passing the Lachine rapids; the Beauharnois canal, by-passing the Coteau-Cascades rapids; the St. Lawrence canal, around the rapids of Cornwall; the Welland canal, climbing the Niagara Escarpment west of Niagara Falls; and the Soo canal taking boats around the rapids at Sault Ste Marie. Thus boats can go right up from Montreal to Port Arthur or Duluth, to Milwaukee or Chicago. Most of these are "canalers" or "lake" boats, for, though the Welland and Soo canals are suited to boats with an ocean-going draught, the St. Lawrence canals are shallow and narrow, and only small ocean boats drawing less than nine feet of water can use the waterway. When the canals are deepened and broadened and the new Massena canal is built, the St. Lawrence Seaway will be the result. It will be able to bear rather large ocean ships right into Lake Michigan and up into Lake Superior. This should vastly increase the amount of trade to Quebec and Ontario and to the American mid-West, making Chicago, which is roughly 1400 miles inland, an ocean port!

As it is, the Soo canal carries a greater volume of trade than either the Suez or the Panama canals. This is, of course, due to the nature of the trade that passes through. From above it, great quantities of wheat and iron, with a considerable amount of timber, wood pulp, and oil go down stream to ocean ports or to the cities of the Lower Lakes; from below, vast amounts of coal move up to the iron fields and cities of the Upper Lakes. Machinery and other manufactures also go upstream.

Cargo Tonnage of Sault Ste. Marie, Suez, and Panama Canals

YEAR	SOO	SUEZ	PANAMA
1931	44,613,671	27,923,717	28,091,236
1951	120,068,562	84,605,600	33,681,760

Other canals were developed in connection with the St. Lawrence-Great Lakes system. Some of these, like the Rideau canal, linking the Ottawa with Lake Ontario, or the Trent canal, linking Georgian Bay with Lake Ontario, have fallen largely into disuse, though still important here and there for power for milling purposes. The Richelieu canal from the St. Lawrence to Lake Champlain and thence to the Hudson, connecting Montreal with New York, is still significant. The Erie canal connecting Lake Erie with the Hudson via the Mohawk valley is very important and offers lake-head grain and other products an alternative outlet to Montreal. Goods go down it to New York.

The Chicago canal leads back to the Mississippi and so joins together the two greatest water route systems of the world. The Mississippi-Ohio-Tennessee Rivers unite the central states of the United States with a far flung series of navigable channels, kept open by dredging and protected by levees. They lead to ocean routes via New Orleans. The Alabama and its tributaries are also canalized, giving the south Appalachian industrial region an outlet to ocean trade via Mobile.

Canalized or controlled river routes are also found on the lower Columbia, as far as Portland, and on the Sacramento from San Francisco into the Great Valley of California.

European canals or canalized rivers are widely used. (See Fig. 13·13.) In England, the Don canal connects the huge metallurgical centre of Sheffield with the ocean. The Manchester Ship canal is even deeper and wider and more effective, leading into the heart of the cotton-manufacturing region. The Antwerp canal leads from that port to the Aachen coal-field and the Maas River. The Rhine and Danube are both extensively used for shipping. Very large boats go up to Basle

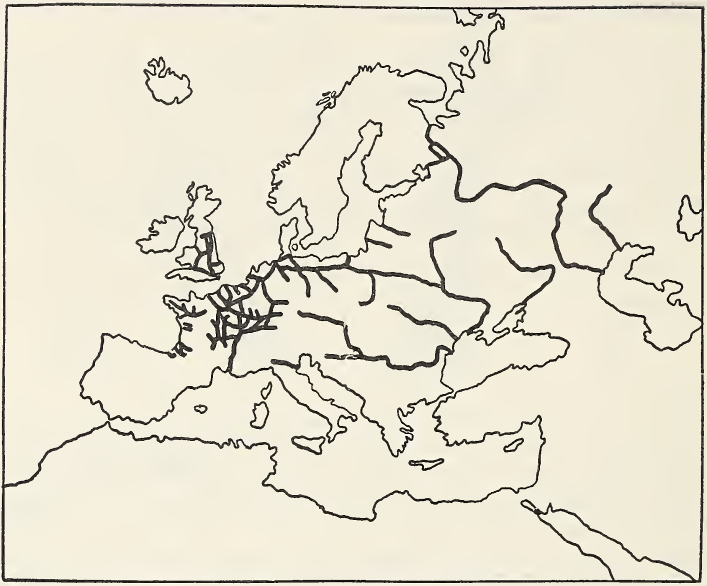


Fig. 13·13. The major navigable rivers and canals of Europe.

on the Rhine and Vienna on the Danube. The Spree canal connects Berlin with the Elbe, Ems, and Rhine, Germany's principal industrial rivers. Along these routes flow vast quantities of goods by small canal boats. The Moscow canal joins the Volkhov with the Volga thus giving access between the Baltic and the Caspian. The Stalin canal links the White Sea with the Baltic Sea via Lakes Onega and Ladoga. A short canal joins the Volga to the Russian Don and so gives access to the Black Sea. Russia makes extensive use of her canals and rivers and for this reason is not quite in such need of railways and roads as the West.

Asiatic canals are numerous in the Indo-Gangetic plain, where the Jumna canal is important, and on the Great North Plain of China, where the famous Grand canal, one of the giant works of man, links the Yellow River with the Yangtze River.

Ocean Water Routes. When men learned to launch out upon the ocean, one of the greatest forces was loosed toward trade and prosperity. People were no longer dependent on the resources of their own country or continent but could draw commodities very cheaply from quite different and distant areas and sell their own goods throughout the world.

The freedom of the high seas was largely effected by the British Navy and has been a principle of world trade since the beginning of the nineteenth century. Thus, with very few exceptions, the ports of all countries are open and accessible to each. This has been a great boon to some countries, like Norway and Greece which, though they do not have much to import or export themselves, do a "carrying" trade in their ships for many other less maritime countries that do not possess a large merchant marine.

The geographical location of ocean routes depends on a variety of matters, such as, accessibility to industrial-commercial hinterlands; shortest "great-circle" routes where possible; avoidance of prevailingly foggy or icy areas, even if it means abandoning the shortest route to choose the safest route; avoidance of regular storm tracks; the presence of fueling depots on the way; the availability of cargoes on the outer and inner journeys; colonial connections, uniting colonies to their homelands, and other political and economic factors.

A glance at the map of ocean routes (See Fig. 13·14.) shows that by far the greatest trade of the world is in the north and south Atlantic basins, then the Mediterranean - Red Sea - Indian Ocean area, then the North Pacific, and finally the South Pacific and southern ocean area.

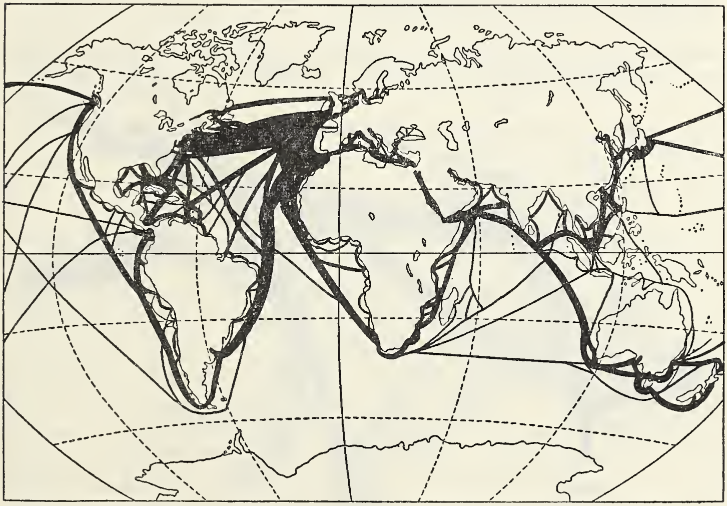


Fig. 13·14. Ocean routes of the world, with their volume of trade. (After Jones and Darkenwald.)

The **Atlantic trade** is so immense mainly because it connects the two greatest industrial communities of the world, north-eastern North America and western Europe. These regions have the highest purchasing power, the greatest productivity, and the most thoroughly commercialized way of life of any in the world, and consequently, use huge quantities of raw materials and fuels, export many commodities, and see an endless flow of travellers, emigrants, and immigrants across the waters.

Fortunately, the physical geography facilitates ocean navigation. Great gulfs or estuaries indent both western and eastern coasts and so carry ocean lanes well into the land, as in the St. Lawrence and Mexican Gulfs, the Hudson and Chesapeake estuaries, the estuaries of the Seine, Thames, Rhine, and Elbe, and arms of the ocean, like the Caribbean Sea, the North Sea, Baltic Sea, and Mediterranean Sea. Also, as has been seen, there is a remarkable concentration of coal and iron around the shores of the North Atlantic, with considerable quantities of oil, together with very fertile agricultural plains. Dense populations on both sides provide a lucrative market.

The main shipping lanes (See Fig. 13·15.) converge on the English Channel from western Europe and cross by the shortest way to the St. Lawrence and Hudson estuaries. Branch lines enter from the Mediterranean and the White Seas on the east and from Hudson Bay, the Mexican Gulf - Caribbean Sea on the west.

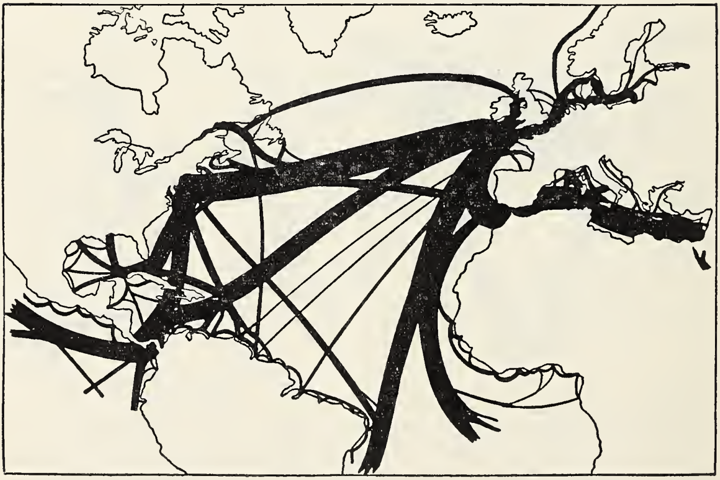


Fig. 13·15. Main shipping lanes of the North Atlantic, with volume of traffic.

Two broad contributary routes, mainly going to or from Europe, extend along the eastern shore of South America as far as Buenos Aires and the western shore of Africa to the Cape of Good Hope.

The Atlantic routes are sufficiently short not to require coaling stations except for ports along the opposing coasts. Gibraltar, Dakar, and Ascension are used as fueling stations off Africa; and Trinidad, Natal, or Pernambuco, Rio de Janeiro, and Buenos Aires on the American shore.

The **Mediterranean-Indian Ocean** trade is very considerable, particularly because of the close ties between East Africa, south Asia, south-eastern Asia and Australia, and Britain, France, Holland, and Portugal. These countries opened up the trade of the East for Europe, importing tropical fibres, forest products, food products, and other raw materials and exporting textiles and machinery. At first they did this round the Cape of Good Hope (originally a Dutch and then a British calling point). In the late nineteenth century, the Suez canal was constructed across the short isthmus between the Mediterranean and Red Seas, and this gave a tremendous impetus to the trade. Fueling stations were established by Britain at Gibraltar, Malta, Port Said, Aden, Colombo, Singapore, and Hong Kong, Mauritius, Mombasa, and Durban. These were widely used by all countries and enabled small tramp steamers to go about picking up what cargo they could. They also served the regular lines. The considerable agricultural and mineral wealth of Africa, Australia, and south and south-eastern Asia, together with the very dense populations of Pakistan, India, and Java, are the basis for the Eastern trade.

The **North Pacific** was rather slow to develop because the Far East tended to trade with Europe rather than with North America. When it did trade with this continent, it often used (as it still does) the Suez route to New York. The population of the west coast of North America was not great, and its own demands on Japanese, Chinese, Philippine, and Indonesian produce was not high. These countries did require California oil and British Columbia timber but not much more.

After the Panama canal was opened, however, the Far East could be reached from Montreal, New York, or New Orleans, or from London and Le Havre as easily as by Suez. As a result, trade grew in the North Pacific. A number of good fueling stations are found en route, including the canal facilities and Hawaii and Manila. Trade has also grown between Vancouver, Seattle, San Francisco, and Los Angeles on the Pacific coast through the Panama to New York and London.

The **South Pacific** is limited in being a huge water body with very little land. Most of the land consists of small islands. The only large land masses, Australia and western South America, have much desert.

Population is, therefore, very low compared with that of the lands of any other commercial ocean. This, coupled with the long distances involved, makes trading precarious except for special products and a few definite passenger lines. However, the numerous islands do provide good fueling stations, as at Fiji, Tonga, or Tahiti.

Shipping varies somewhat in its needs according to its services. There are large **ocean liners**, carrying both cargo and passengers, that follow a regular route, on a regular schedule, and require goods to be assembled by railway or by coastwise shipping at their few ports of call. **Tramp steamers**, on the other hand, are not bound by schedules or routes but "tramp" the oceans, usually along more or less regular "beats" but often freely and independently, looking for cargoes, carrying from one port to a second, picking up a new cargo there for a third, and so on. They usually take on dirty, dusty, smelly, or sticky cargoes that the "liners" do not handle. Certain **specialized boats**, like oil tankers, ore boats, banana boats, refrigerator boats, carry directly from the raw material producer to the industrial consumer. They usually work on regular lines but carry only the one type of cargo for which they are suited.

Canadian shipping contacts are very widespread since Canada has become the world's third leading trader, thanks to high per capita production, a great wealth of food and natural resources, a high surplus for export, and a good geographical location for the European, Latin American, Far Eastern, and Australasian trade. Regular lines connect its eastern ports with Britain and France and other western European countries and also with the West Indies and Central America. Special lines come from the Middle East and West Africa. In the Pacific, regular lines go to Japan and to Australia.

CANADA AND THE AIR AGE

Flying is the modern way of carrying mail and passengers or high-priced cargo. In many cases, the time saved redeems the extra money expended. But, although planes can fly over mountains, deserts, and seas, and therefore are not controlled by topography in the same way as trains or boats, yet they are conditioned by certain geographic facts. (See Fig. 13·16.)

Flight lines are principally from one populous area to another. Unless there is considerable travel and intercourse between regions, it is not feasible to maintain the high cost of air routes. Planes are limited in the distance they may economically fly, by their "payload"; that is, by the amount of paying weight they carry. Obviously this may be increased and the load of fuel decreased if the "hops" between places are short.

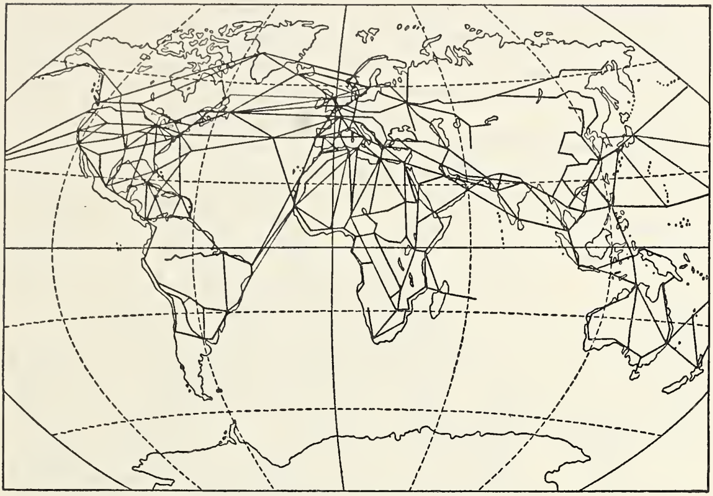


Fig. 13·16. The principal world airlines and airway junctions.

If they are long, the planes must take on more fuel at the expense of "payload". About 2000 miles is considered a paying "hop" today.

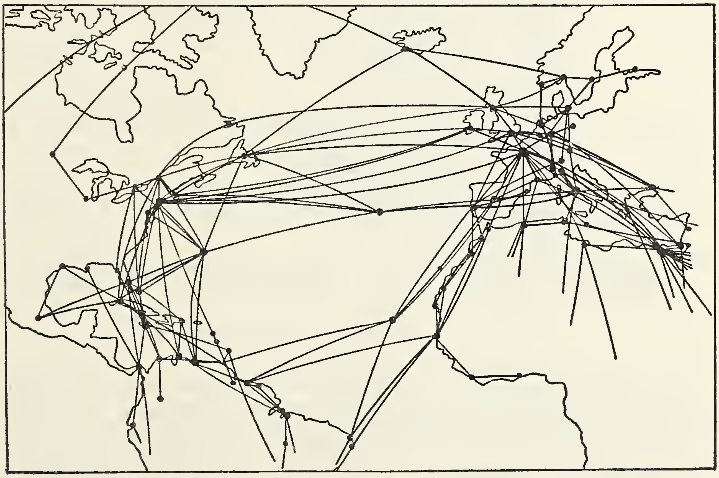


Fig. 13·17. Airways of the north Atlantic community.

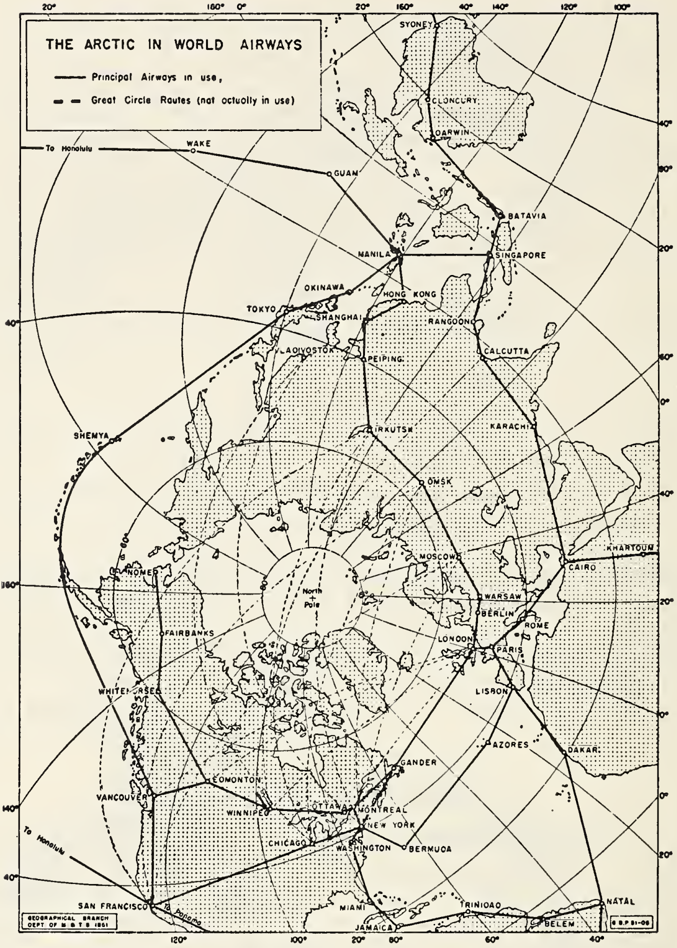


Fig. 13·18. The Arctic in world airways.

Since some deserts and many stretches of ocean are longer than this, oases, peninsulas, and islands take on a new significance. In trans-ocean flying, the near approach of opposite shores, outposts formed by peninsulas, and stepping stones made by islands are all very important in locating the routes. The nearest approach of Europe and North

America is between **Canada and the British Isles.** Fortunately, Canada thrusts far out in Labrador and the Island of Newfoundland, and the British Isles in Eire, and this has made Goose Bay, Gander, and Shannon principal way stations between New York and London, or Montreal and London. (See Fig. 13·17, page 231.)

In the **North Pacific**, Canada and Alaska, together with the Aleutians, thrust far out towards Japan and east Asia, and a main route follows this course from Seattle via Whitehorse and Fairbanks to Japan. America possesses the valuable stepping stones of Honolulu, Midway, Wake, and Guam to lead flight lines across the middle of the North Pacific. From Honolulu, Canadian lines jump to Fiji and Australia.

The weather is a major factor in flying. If a plane has to fight a strong head wind, it uses up much more fuel and cannot make so profitable a run as if it were flying in a calm atmosphere. The Aleutian route to the Far East is often so stormy that planes prefer the Hawaiian route, though longer, because it is calmer. Stratosphere flying is probably calmer than flying in the troposphere. Already so-called **strato cruisers** fly well up in the troposphere.

Since distances between North America and Europe and Asia are shorter over Canada than across the North Atlantic and North Pacific, and since the stratosphere comes lower over the north than anywhere else, it is quite likely that Canada will be the air hub of the future. (See Fig. 13·18.)

QUESTIONS

A

1. What passes in the Canadian Rockies and what passes in the Canadian Appalachians have assisted in the development of coast-to-coast railways? (See Fig. 13·1.)
2. Where are the regions of the world with a relatively dense network of railways? (See Fig. 13·7.) Where are those without any railways? Account for the uneven distribution.
3. Identify and name the principal air routes of the world as shown in Fig. 13·18.

B

4. Make a diagrammatic sketch, as in Fig. 13·2., showing the importance of Winnipeg as a transportation centre.
5. Explain why New York and Chicago are such great railway centres. (See Fig. 13·10.)
6. Identify and name the European railway centres shown in Fig. 13·11.
7. Compare and contrast the use of canals in North America and in Europe as judged from Figs. 13·12, 13·13.
8. Account for the high concentration of ocean traffic in the North Atlantic. (See Figs. 13·14, 13·15.)

9. Which seems the shortest route from Copenhagen to Winnipeg in Fig. 13·17? Which is the shortest when these routes are traced on a globe?

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CHAPTER XIV

Geography and Rural Settlement

Modes of life, economic development, trade and transportation all influence the rise and distribution of settlement. Therefore, in a sense, settlement is the summation of geographical factors. It responds to both physical and human influence. This is seen in the details of its houses and streets, in its main divisions into rural and urban types, and in its concentrations over the earth.

Geography and Types of Housing. Houses are works of man which make a very real, concrete impression on the landscape. The geographical description of any region, therefore, must take them into account, together with the way in which they are grouped. Since houses are usually adapted to their local surroundings, they help one to appreciate the flavour of the environment. An attempt to recall a landscape brings to the mind's eye the houses which are such a typical expression of it. Thus one recalls the simple, almost box-like frame houses on their rocky perches facing the blue Atlantic along the shores of Newfoundland and Nova Scotia. (See Fig. 14·1, page 236.) To speak of the Isle of Orleans is to call to view the stone houses with their high, steep roofs sweeping down in a graceful curve to a broad eave, broken by narrow, peaked dormers. (See Fig. 14·2, page 237.) Old Ontario homes are of grey limestone in a severe, geometrical style, often with an arched doorway for relief. (See Fig. 14·2.) However, the typical Ontario scene is expressed in the tall, brick houses with steep roofs, highly ornamented gables, a pointed arch over the door, surrounded by a broad, pillared verandah. (See Fig. 14·2.) The Prairies of pioneer days are recalled nostalgically by pictures of low, sod-roofed houses. These have disap-

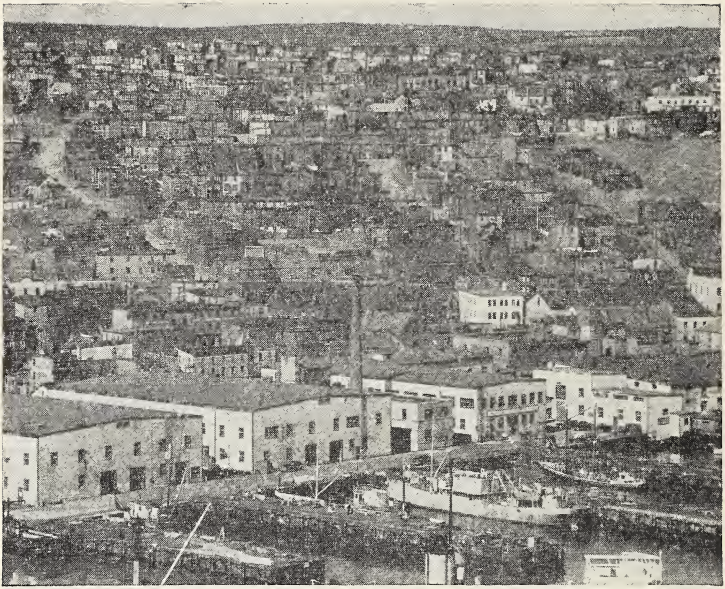

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Fig. 14·1. Box-like frame houses, St. John's, Newfoundland, rising tier on tier up the steep slopes from the harbour.

peared and have given rise to frame houses of various styles, the polyglot nature of the Prairie peoples being reflected in the many traditions there. Beyond the mountains, on the Pacific shores, the ranch-style home is popular, (See Fig. 14·2.) and, on the edge of lofty slopes, its long, low lines, with wide windows let into cedar shingle walls, are very appropriate.

Climate and Housing. There is a close relationship between housing and climate. So much is this the case that in the laws defining building specifications in Canada, climatic differences are taken into account. A climatic atlas illustrates the regulations. In Canada, east of the Coast Range, houses have to be made to keep cool and airy during hot summers and warm and well sealed during long, cold, snowy winters. In the north, houses are built on frozen soils and must have well insulated floors or other protection against "heaving" from beneath. On the rainy Pacific, houses need eaves-troughing. This is often omitted in the east because it fills with ice in winter. Roofs are usually steeper in the

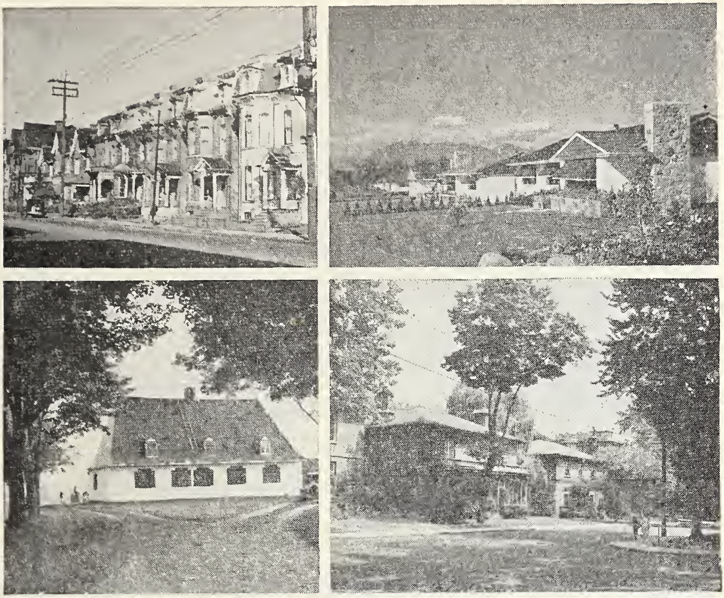
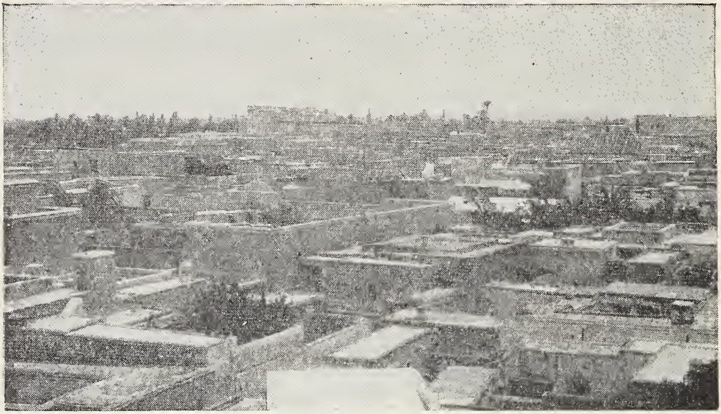


Fig. 14·2. House types in Canada reflect local environment and tradition. Lower left, French Canadian home on the Isle of Orleans: lower right, old stone house, Kingston; upper left, Victorian row of houses, Toronto; upper right, ranch-style houses, Vancouver.

east in order to shed snow. However, if the house comes right to the edge of the street, then an iron guard is fixed to the eave to prevent the snow sliding off onto people walking beneath.

In the world at large, many adaptations are made to climate, from the snow-house of the Eskimo to the thatched hut of the Malayan peasant; from the low, round-roofed home of the Hebridean, protected against wind, to the steeply pitched roof of the Swiss, built to shed snow; from the slit-windowed houses of the blazing deserts of Morocco (See Fig. 14·3, page 238.) to the open, ventilated home of the humid jungles of the equator. (See Fig. 5·3.)

Housing and Available Materials. Houses are also modified by local building material. Most of the early Canadian homes were log cabins. (See Fig. 14·4, page 238.) As the woods were cleared away, the red sandstones of Acadia, the grey limestones of the St. Lawrence lowlands, the hewn granite of the Nova Scotia uplands, the brown sandstones of the



Ewing Galloway

Fig. 14·3. Desert homes, as in Marrakesh, Morocco, are usually low, with flat roofs, narrow doors, and slit windows. They are generally painted white to throw off the sun's heat and keep the interior cool. Compare them with the open-sided buildings in the rainy tropics, in Fig. 5·3.

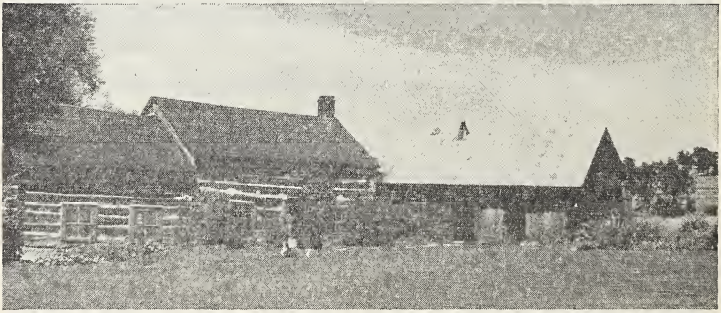


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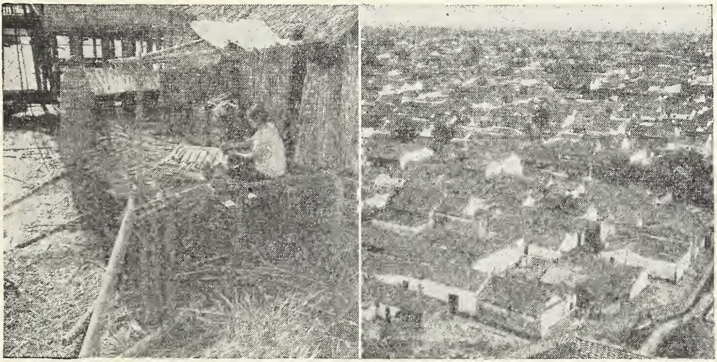
Fig. 14·4. Log cabin and log barn, upper Ottawa Valley farm, Ontario. Note the thick plaster of lime between the logs. Roof on right was formerly of shingles, as on main house, but now is galvanized iron.

Ottawa Valley—all these gave variety to the scene. Later still, brick became popular because it was both durable and cheap, but the bricks varied in colour according to local clays. When western sawn lumber became available in quantity, clapboard houses were put up everywhere.

Most parts of Canada have all four varieties, although log cabins and dressed-stone houses are much less common than brick or frame ones.

In Europe, wooden houses are still dominant in Scandinavia and northern Russia, but brick houses prevail throughout the rest of the continent, where wood is rather scarce. In China, the reverse is the situation. Brick or mud houses are common in the north; houses of wood or matting replace them in the south, where dense groves of bamboos are nourished by the Monsoon. (See Fig. 14·5.) In northwest China, many homes are hollowed out of the side of loëss deposits. Rock-hollowed homes are not infrequent in the deserts of Arabia, where they are shady and cool. Most tropical humid lands, where vegetation is so abundant, have wooden homes with thatched roofs and occasionally with walls of matting.

Housing and Tradition. Human traditions naturally find their expression in the house. Architecture is one of the great arts of the race. Consequently, the actual style of the house in any region, after due allowance has been made for climate and available materials, is the result of the customary art of the people concerned. In Canada, Quebec has a characteristic architecture derived mainly from the baronial style of Normandy or the chateau tradition of Orleans. The rest of the country is more mixed. However, Victorian English is a tradition common to the Maritimes and Ontario, which were largely settled in Victorian times by immigration from Britain. The strongly individual style of the American Pacific has invaded British Columbia. In all our large



Burton Holmes, from Ewing Galloway *British Information Service*

Fig. 14·5. Comparison of lattice and thatch homes of south-eastern China with brick and tile homes of northern China.

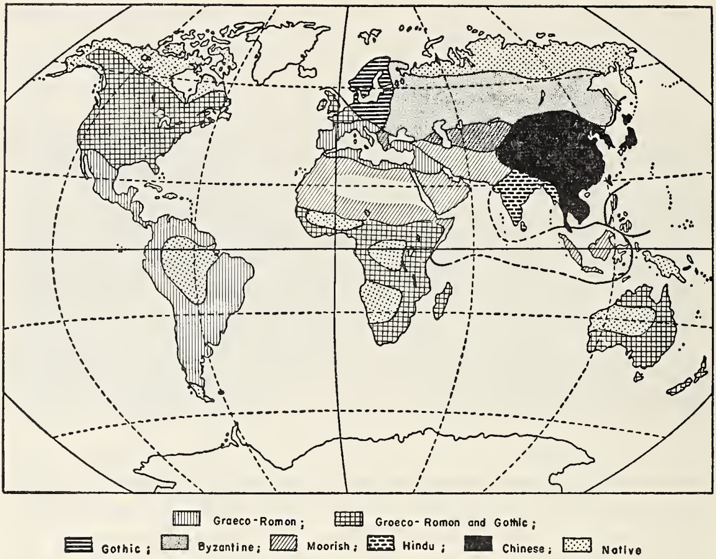
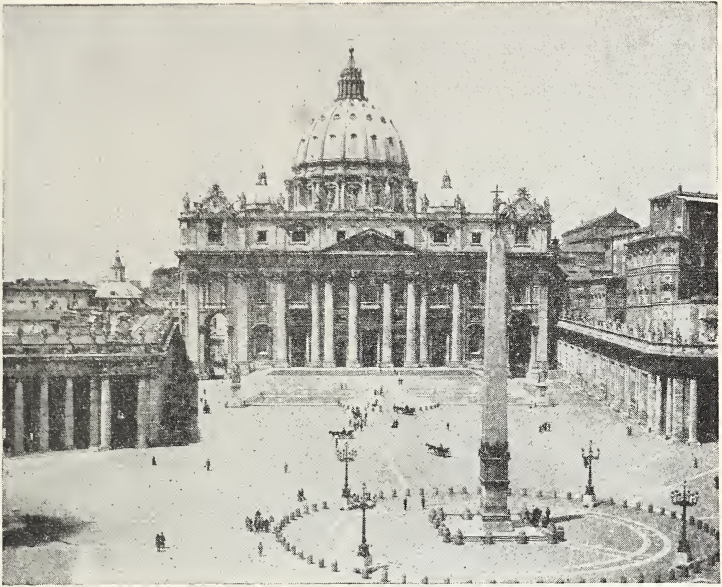


Fig. 14·6. Distribution of major forms of architecture.

cities, the Byzantine style of Ukrainian churches and halls vie with the Roman or Gothic derivatives of the Catholic or Protestant suburbs. In Edmonton, a typically Arab mosque is found.

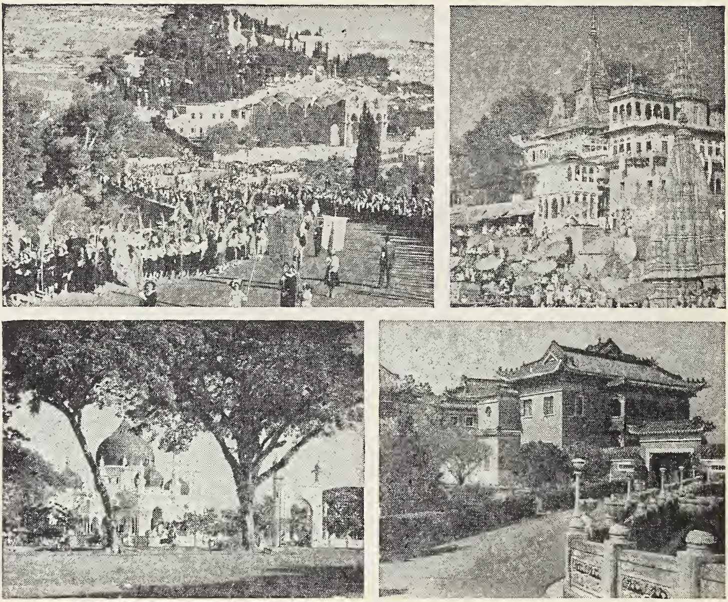
On a world basis, there seem to be a few prevailing styles that profoundly influence wide areas. (See Fig. 14·6.) The Graeco-Roman types of architecture, (See Fig. 14·7.) with frequent use of columns and of triangular pediments, with carved tympanums, are widespread wherever the Latin culture has gone; that is, throughout the Mediterranean, in latinized portions of Europe, such as southern France, and in Latin America. Gothic architecture, (See Fig. 18·3.) depending on the high, pointed gothic arch, massive walls, great windows, and on supporting buttresses, really characterizes Teutonic culture; it is found throughout Europe north of the Alps and west of the Vistula and has been carried by the British throughout Anglo-America and the English-speaking nations of the Commonwealth. The Byzantine style, with massive domes and subsidiary dome-topped, bulbous-looking towers, is the third main European style and is found in eastern Europe, especially Russia. (See Fig. 14·8, page 242.)



Ewing Galloway

Fig. 14·7. Renaissance Graeco-Roman-inspired architecture typifies the city scene of Mediterranean and Latin American countries. St. Peter's, Rome, is a celebrated example.

The Moorish style, (See Fig. 14·8.) with its pointed dome, balanced by very tall, graceful minarets, and with its scalloped arches and fretwork friezes, (one of the most beautiful creations of man) is expressive of the Arab world from Morocco to the Hadramaut. The Mogul rulers of India introduced it there. Some of the greatest of the Moorish shrines are thus found in Pakistan and India. However, India is more commonly associated with the Hindu style of architecture, (See Fig. 14·8.) where temples are built up tier on tier, each succeeding level being narrower and narrower, giving the overall appearance of a pyramid. Each tier is elaborately decorated with beautiful carvings. Chinese architecture is notable for the tier-like structures, divided by gracefully sweeping roofs, called pagodas. Most temples, and even many houses, have lovely curved, upswept roofs, with a latticed frieze and carved pillars below. Chinese architecture has profoundly influenced that of Japan and of south-east Asia. (See Fig. 14·8, page 242.)



Ewing Galloway, British Information Service, Shell Oil Co.

Fig. 14·8. Four outstanding types of architecture which dominate large parts of the world scene: upper left, Byzantine–eastern Europe, and Siberia; lower left, Moorish–Middle East and north Africa; upper right, Hindu–India and parts of south-eastern Asia; lower right, Chinese–Far East.

PATTERNS OF RURAL SETTLEMENT

The way in which houses are distributed and the patterns which those distributions make are also very significant in the geography of different landscapes. Mention has already been made of the strong sense of unity which pervades a Quebec village, centred on its little square outside the single parish church as compared with the impression of "discordant togetherness" in an Ontario village, where several churches vie with each other, or commercial buildings vie with the church for the dominant position. These are immediately observable differences in the cultural landscape of the two provinces, even though the physiography, soil, vegetation, or climate make no apparent break.

Generally speaking, the way in which houses are distributed is a function of the way in which society is organized. French Canadian society is organized in small groups that have their focus in the Roman Catholic church; its faith makes it homogeneous, though not uniform, in character, By constrast, the Anglo-Canadian society is heterogeneous, without a single great focus; some elements looking to religious insitutions, others to secular institutions; some looking to a single institution, and some to a variety of them.

It is, therefore, impossible to say that the distribution of rural settlement is due directly or mainly to the physical environment. It might be supposed that narrow valleys in mountainous areas would draw all the houses together at a focal point in a nucleated type of settlement. Conversely, it might be thought that a flat plain, offering no barrier to movement, would tend to produce a widely scattered distribution of settlement. However, in parts of Scotland and Scandinavia, mountains see an open, dispersed settlement, whereas the open plain of Poland views a close grouping of houses in highly nucleated settlements. Many other examples could be given. French-Canadian settlements are relatively compact in both mountain and plain; Anglo-Canadian settlements are comparatively open in each of these environments.

There are **two main categories** of rural settlements: agglomerated or nucleated on the one hand and disseminated or dispersed on the other. Agglomerated settlement dominates in central, southern, and eastern Europe, in Latin America, Africa, and Asia. Dispersed settlement tends to dominate in western Europe, Anglo-America, and Australia-New Zealand. However, the two types penetrate each other deeply. One thinks of China as the home of highly nucleated "kin" villages. But in the Yangtze delta, settlement is dispersed, the innumerable irrigation canals dividing the land into small units, each with its own farm. Similarly, in Indo-Pakistan, one thinks of compact "communal" villages, inhabited by groups of Mohammedans, Sikhs, or Hindus. But in eastern Bengal, much of the settlement is dispersed, as it is also on the Malabar coast. Here the care of small plots of trees tends to divide the farm land into small holdings.

The tradition in Europe used to be strongly in favour of nucleated settlements, especially in "manorial" villages, where tenants crowded together round the home of their landlord. In Russia, this has passed without much outward change, though with a profound social difference, into "collective" villages. In western Europe, north of the Alps, the manorial system largely broke up, and there was a widespread dispersal of houses. The tradition of dispersed settlement was carried to Anglo-America, but Mexico and the rest of Latin America kept up the Latin type of village life. Large estates are being broken up in South America and divided among small holders who live on their separate farms. Thus it is difficult to draw mutually exclusive regions; one can only trace areas of predominance in one pattern or another.

Nucleated Settlements. Closely knit settlements were probably the first to develop. Hunters and pastoralists moved about and lived in compact groups. When they settled down as farmers, they probably continued their ancient, gregarious habits. Moreover, the necessity of defence against wild animals and against robbers or hostile clans or tribes was a powerful force in keeping people together. Then, too, there were not the good roads or the ready means to travel from farm to market and back, such as would have been necessary in dispersed settlement. On the contrary, people had to live within a short distance of each other to exchange goods, get repairs done on their homes or equipment, perform their daily religious rites, and help each other at times of crisis. So they remained close together.

In some areas where the clan or family is very highly revered, people related to each other and with the same name will settle together in what may be described as **kin villages.** Very common in China, they are not infrequent in Europe, too, where small Scottish settlements may be of this kind. Some Scots carried over the practice of living in clan groups to Canada, and in parts of Nova Scotia and Old Ontario, there may be found loosely knit villages where the people are almost all of the same name or are closely related.

Communal villages, as they are sometimes called in Indo-Pakistan, are settlements dominated by a single culture, forming separate communities on religious or ethnic grounds. These are fairly characteristic of Europe wherever there are strong minorities within a majority community. They have been brought to Canada by these very minority groups or have been set up by other groups which have become minority ones in Canada. Thus there are numerous Mennonite, Doukhobor, German Catholic, and Ukrainian villages where these people have banded themselves together to perpetuate their old beliefs and customs. They were helped by the "bloc" method of settlement adopted in the early part of the century that permitted "blocs" of such people to take up land and settle together.

Most of the European villages are, or have descended from, **manorial villages.** The manor was the unit of land division under the old feudal system by which the King divided the land into so many large estates, owned by dukes or counts, and these were divided again into lesser estates, owned by lords or knights or simply by landed gentry. Each of the larger estates consisted of a number of manors, which were villages grouped about a castle or manor house. The lord of the manor owned all the agricultural land around, although woodland and pasture were often held in common by all the people of the manor. These people were tenants who got strips of land from their feudal chief. These they worked in part for him and in part for themselves. Each day they went out from the village to their several strips and worked until evening.

European manorial villages took three characteristic patterns. The most common was an irregular stellar shape, with roads coming in at uneven angles according to the local topography. Very frequent in Germany was the long, rectangular shape, where the village, cut out of the forest, consisted of two lines of houses down a central street. In eastern Europe, a round shape is often found, with the houses built in a circle around a central green, each backing onto its own garden and the village lands beyond. (See Fig. 14·9.)

Even where the manorial aristocracy has had to give up its privileges, as has happened in several western democracies, the old pattern of settlement has continued. People may have consolidated their

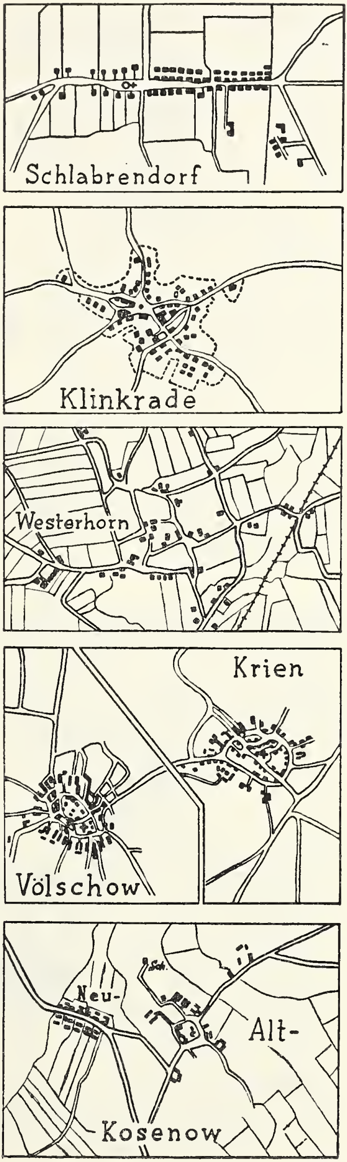


Fig. 14·9. Village patterns in Europe vary considerably. Among the more important are: (a) the linear type, e.g. Schlabrendorf, with a single or double row of houses on each side of a long central street, which may be wide enough to contain a church; (b) the stellar type, e.g. Klinkrade, where roads radiate out to give a star-like shape to the village; (c) the loose or open irregular type, where there is a loose grouping of houses in a site crisscrossed with lanes; (d) the round type, e.g. Völschow and Krien, common in the Slavic countryside, where roads come in like spokes of a wheel to a central hub, usually a village green dominated by a church; (e) a combination or mixture of types, e.g. Neu- and Alt-Kosenow. Here the round Slavic type of Alt-Kosenow has been rivalled by the linear German type of Neu-Kosenow.

several strips into farms; they may even have ceased to be tenants and have come into possession of the farms; yet they continue to live in the village, as of old, and go to and from their farms by morning and by evening.

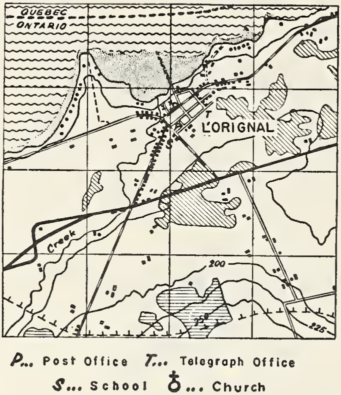


Fig. 14·10. The old seigniorial type of settlement, not greatly altered by time, is exemplified by L'Orignal. Here roads from the outer part of the seigniory meet, and a fairly compact village with the high-towered church at the centre has emerged.

The nucleated village was established by the French aristocracy and rich landholders in New France who were given their *seigneuries* or *manoirs* along the banks of the St. Lawrence and Ottawa, the St. Maurice and Richelieu rivers. So the manorial system was set up, and although its aristocratic associations later came to an end and tenants became landowners, yet the village pattern continued and still exists. (See Fig. 14·10.)

There are counterparts of this nucleated settlement in the **plantation villages** of the southern states of the United States and in the *haciendas* of Latin America. When a plantation was set up, its owner built, in

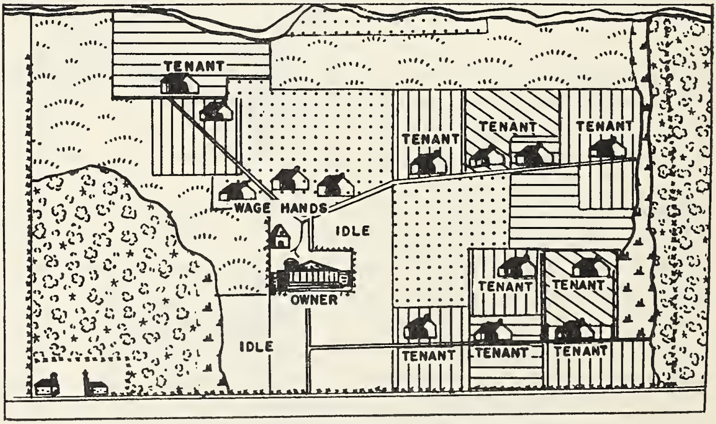


Fig. 14·11. North Carolina plantation settlement. (After Parkins.)

addition to his own home, homes for his overseers and workers. These were usually grouped together, along with a mill, a smithy, a church, and a school, to form a small village. In fact, on large plantations, several such villages emerged. There was no opportunity for dispersed settlement, since the workmen were hired hands and worked in teams; they did not own or even rent land individually. Even though renting is now common enough, the tenants tend to go on living together in groups. (See Fig. 14·11.) The same conditions prevail on the *hacienda.* There the landholder also hires workers or works on a share-crop basis with a group of tenants; he also builds homes for his foremen and ranch hands or plantation workers; he does so close to, and under the supervision of, the main building or ranch house, where he lives. So a compact settlement develops. (See Fig. 14·12.)

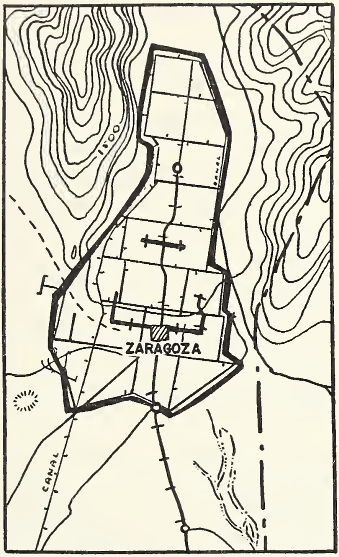


Fig. 14·12. A Mexican hacienda consists of a highly nucleated village, such as Zaragoza, with roads and canals radiating out to the fields. In some of the larger haciendas small railways may connect outlying parts of the estate with the centre. The whole is worked on a highly organized basis by groups of cultivators who go out from the main settlement.

Collective villages have grown up in Soviet Russia and other communist countries. There, all the land belongs to the State. It is divided up into very large collective farms where the farmers have to work collectively for their livelihood, sharing equipment and seed, ploughing and harvesting in teams, and enjoying the fruits of their labour in common. It is, therefore, necessary for them to live in common, and nucleated villages are the result. Actually, this is no great innovation. The villages are much the same as the feudal ones of the ancient régime. Their lands have simply been consolidated, and where formerly individual tenants went out to work their several strips on their own, now they do it together. They still live next to each other in the village of their forefathers.

This type of settlement has not been copied to any extent in North America except by a very few groups of "Christian Communists", who believe in owning all things together and sharing and living alike. These have set up what are in effect collective villages. Co-operative farming also has a tendency to bring together those farmers who work together; however, since good roads and fast automobiles make it possible to live apart yet farm together, collective villages by no means always follow co-operative action.

Dispersed Settlements. In western Europe, north of the Alps, the break up of the feudal system with the rise of economic and social democracy, was closely associated with the agricultural revolution. The two things led to the break up of the manorial lands, the consolidation of strips of fields into single, well balanced farms, the division of the village "commons" into further farm land, and the emergence of a sturdy class of commercial farmers. These wished to operate the land from a home in the midst of the fields. This gave them a much closer tie with the land, saved much time and energy, and enabled a more independent and efficient use of the land to develop. So villages dwindled and

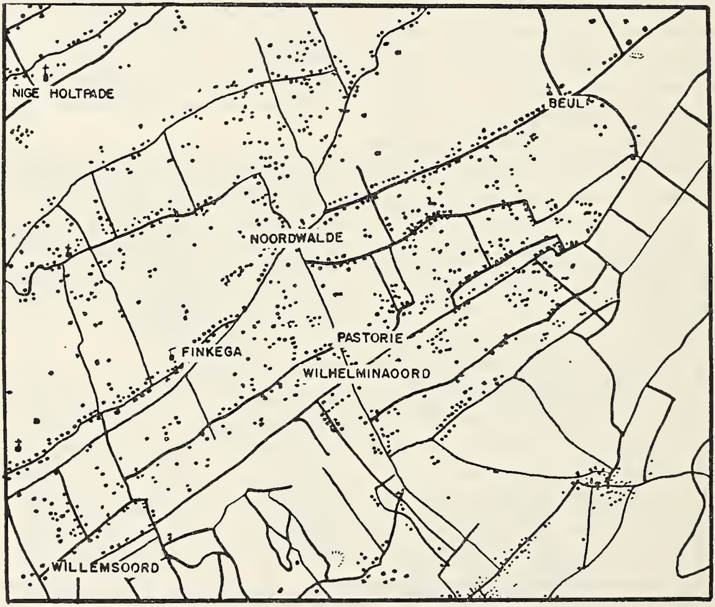


Fig. 14·13. In western Europe there is a strong tendency towards a dispersal of settlement, away from nucleated villages out into the open country. Here very few nucleated villages occur. Most people live on their farms surrounded by their own fields.

died. Goldsmith's "Deserted Village" shows a nostalgic, though probably misplaced, concern for the passing order.

> Sweet smiling village, loveliest of the lawn
> Thy sports are fled, and all thy charms withdrawn.

Strangely, in this case, as in many others, the village disappeared because the lord of the manor turned the "commons" and even the tenants' lands into great sheep runs and ran the new estate with very few helpers. A more economic use of land resulted, although it did depopulate the estate and so broke up the ancient nucleated settlements.

In any event, all over Britain, north France, the Low Countries, west Germany and Scandinavia, this change went on; the villages declined and settlement became dispersed. It consisted of larger or smaller units of land operated as self-contained entities. (See Fig. 14·13.)

When settlers from these regions came to Canada, they were used to living alone and working individual farms; consequently they looked for the opportunity to own and operate quite separate parcels of land in the countryside. They chose to settle, not in *manoirs*, but on separate lots. A system grew up by which land was divided into townships, concessions and lots, as in Ontario, or into sections and quarter-sections, as in the Prairies, and the maximum possible spread or dispersal of settlers over the land was achieved. (See Figs. 14·14a and 14·14b.)

This open type of settlement is also the one most widely developed in the United States, and is today the dominant one on our continent.

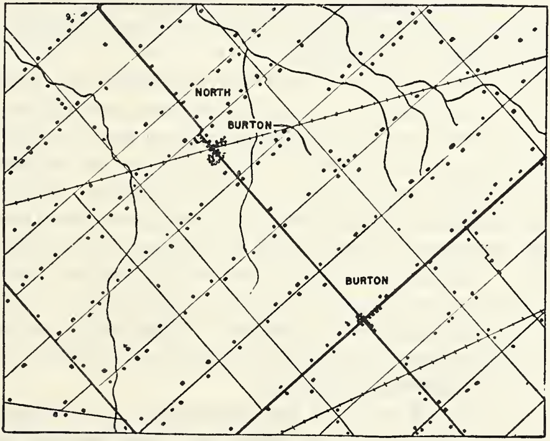


Fig. 14·14a. Eastern land divisons and settlement: Ontario

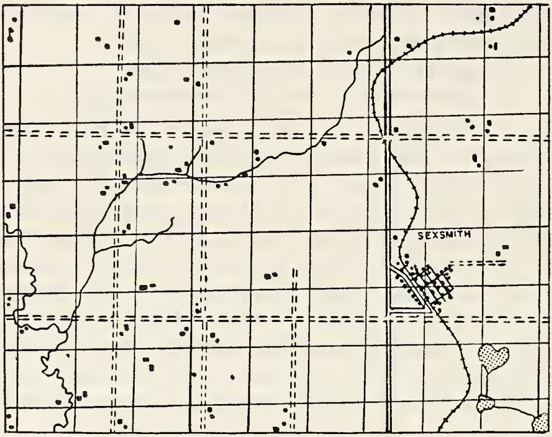


Fig. 14·14b. Western land divisions and settlement: Alberta.

That is especially the case because there is a higher proportion of farm owners here than in Europe or anywhere else. The urge to own land for oneself probably does more than anything else to disperse rural settlement. It allows people to develop their land in their own interest. Thus it helps them become independent of the direction of estate owners, and frees them from communal, ethnic, or religious domination, enabling them to stand up for themselves, follow their own initiative, and be responsible for their own policies.

So strong is the tendency for the "individuation" of operation that many nucleated settlements are gradually breaking up in Canada. First they are "invaded" by someone who does not care for their strong "in-group" feeling, for the way in which, because of national origin, language, or religion, they tend to keep people together. As the invasion shows how successful the individual can be on his own, some members of the village community become eager to operate their own farms in a similar way. Leaving the village to live on its outskirts, they come to mix with people of other race, language, or religion and so become less clannish, less communal, less parochial. Consequently, although dispersed settlement may break down strong local loyalties, it tends to increase nation-wide understanding.

However, it should be noted that dispersed rural settlements must obtain financial, commercial, mechanical, and other services from common centres, must be able to bank and shop somewhere, and must sell their produce through some common centre. Consequently, though dispersed settlements may weaken village life, they strengthen town life. To run efficiently, they must have access to a central town. Thus city life and dispersed rural settlement go closely together, especially in a highly mechanized and commercialized society such as ours.

QUESTIONS

A

1. Describe how the shape, structure and materials of houses differ with climate, using as your examples houses pictured in Chapters V, VI, and VII, as well as in Figs. 14·1-5.
2. To what extent is Canada a rural nation? What per cent of the total population in each province is made up by rural dwellers? (See Fig. 15·1.)

B

3. Describe the characteristics of nucleated rural settlement.
4. What is meant by the terms: kin village, communal village, manorial village, plantation village, and collective village?
5. Are these villages common in Canada? Do you know of any in your neighbourhood? If they should occur, where would you expect to find them?
6. Compare and contrast the settlement patterns in Fig. 14·9 with those in Figs. 14·14a, 14b.
7. Which European pattern comes nearest to that in Fig. 14·14a?

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CHAPTER XV

Urban Geography

THE URBAN WORLD

Mumford remarks that "cities are the region in human expression". They mirror in a small space the whole landscape which they serve and feed on, which, in fact, they organize. They reflect the influence of geology and topography in their arrangement of roads and of some of their industries. They show the effects of climate in the architecture of their houses, their clothing and eating establishments, and in the forms of their recreation centres. They reveal the soils and agriculture of their neighbourhood by the markets and agricultural industries they possess. They indicate the race or culture of the vicinity in quarters devoted to people of one group or another, in their halls and churches, and perhaps, too, in their shop signs and traffic notices. They show the density or sparsity of the population by their size and the functions they perform. They unfold the economic development and stage of growth of the region by the kinds of businesses, industrial buildings, and activities they have. They display the political significance of the area by the sort of administrative buildings which are there.

Cities are a complete cross-section of both the physical and the human geography of the whole sphere in which they have any influence. Thus urban geography is, in a way, a cross-section of geography as a whole.

This is especially true today, since most regions of the world now have their cities and are centred in them. It was not so true of ancient and mediaeval times when much more of the world was really rural and there were fewer cities. Today, cities have become part and parcel of civilized life. This is so much the case that even rural areas are now largely urbanized and have a city culture, based on commercialization, mechanization, and an essentially urban outlook.

Canada's Condition. In 1871, when Canada's first nation-wide census was taken, 19·6% of the population was urban; by the beginning of this century, 37·5% was urban. In thirty years the degree of urbanization had doubled. Since then the rate of urbanization has continued to be rapid and in 1951, at the middle of the century, 62%, or nearly two thirds of the population, was urban.

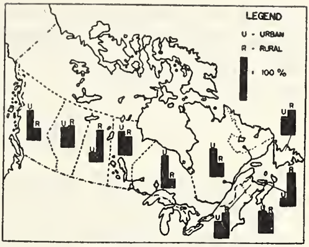

Fig. 15·1. The urban-rural population of Canada.

Today, Canada is a distinctly more urban than rural country. (See Fig. 15·1.) Although many Canadians like to think that what is typical of Canada is a little fishing cove in Newfoundland, an apple orchard in Nova Scotia, a tiny village nestling by the St. Lawrence shore in Quebec, dairy cattle deep in hay under the shade of the elms on a sunny summer's day in Ontario, a rolling field of wheat in the Prairies, or a lumber camp in the heart of the cathedral-like forest of British Columbia, actually what is most typical for most Canadians is a paved square surrounded by tall skyscrapers, with glass-fronted stores, and theatres flashing with neon lights, a cloud of smoke above, and the wail of trains in, or moving out of, the city!

The present population is 16 millions. That of Montreal alone is 1,595,327. Thus 1 in every 10 Canadians lives in this one city! Take the roll call of all the cities over 100,000 and it will be seen that more than 1 in every 3 Canadians live in a few moderately large centres.

1.	Montreal	1,595,327	8.	Edmonton	248,949
2.	Toronto	1,347,905	9.	Calgary	196,152
3.	Vancouver	658,813	10.	Windsor	184,045
4.	Winnipeg	409,687	11.	Halifax	159,678
5.	Ottawa	335,289	12.	London	153,491
6.	Hamilton	325,238	13.	Victoria	123,033
7.	Quebec City	301,108			

Another significant indication of the importance of the city in Canadian life is that three-fifths of the immigrants to Canada since 1920 have been absorbed by cities. No longer do people come here mainly to cut trees in the bush, dig ore in the mine, or follow a plough. Important though these activities are, they have given precedence to work in factory or in office.

World Comparisons. Actually, urbanization is not peculiar to Canada. In fact, many countries are much more highly urbanized. This is how the ten leading urbanized communities compare with Canada:

1.	The United Kingdom	89%	urbanized	6.	Australia	63%	urbanized
2.	Germany	85%	"	7.	Canada	62%	"
3.	Belgium	80%	"	8.	Japan	60%	"
4.	Holland	73%	"	9.	France	59%	"
5.	Italy	64%	"	10.	U.S.A.	56%	"

The only leading countries that are not more urban than rural are Russia, China, India, and Pakistan, but in each of these, urbanization is increasing rapidly.

THE NATURE OF A CITY

Though everybody knows what cities are, they are hard to define. Thinking of the *form* taken by a city one might say that, "A city is a concentration of people in a built-up area which is considered large for its time and place." Jefferson suggested it was a concentration at least ten times higher than that of the surrounding rural area. It includes typically urban buildings such as multiple dwellings and office blocks.

Thinking of its *functions* one could say that, "A city is an administrative centre, recognized as the focus of a community by distinctive services and activities." Typically, it includes transportation junctions, markets for exchange, financial institutions, cultural and recreational facilities for its region, not found outside of it. It has the widest range of social contacts and a distinctive social character. Cities differ from rural areas in social relationships between individuals or groups in that contacts are more casual, more transitory, and more impersonal and anonymous than those of the country. "If you would be known, and not know, vegetate in a village," Colton wrote. "If you would know, and not be known, live in a city!"

There *is* such a thing as a distinct city way of life. The social structure of cities is dominated by "interest" groups rather than by "locality" or "kin" groups. That is to say, people work, worship, or play with those who share their professional, religious, or cultural interest rather than with those who live side by side with them or who are tied to them by blood.

Social circles are larger, and the individual is represented in many different groups. There is a much greater freedom of choice in selecting the associations that the individual desires to make, in choosing his neighbours or those with whom he will work, and in following the hobbies or joining the clubs he particularly likes. Barnes remarks that "Capitalism, nationalism, secularism, industrialism, and urbanism have all grown up together."

There is no aspect of life in which the city has not produced its own characteristic modifications. Since the day when Britain abolished the Corn Laws and sacrificed the interests of its farmers to those of its urban-industrial workers, every modern state has had to concern itself more and more with the demands of the urban section of the population and adjust its national policy accordingly. The Church has had to adapt itself to provide what is essentially an urban programme in order to keep abreast in its techniques with the offerings of other organizations. The family has had to accommodate itself to the interest groups and to the fact that its members may well spend more of their time in those interest groups than in the bosom of the family. Education has had to gear itself primarily to preparing people for urban pursuits and tastes.

FACTORS IN URBAN DEVELOPMENT AND LOCALIZATION

The location, form, function, nature, and influence of cities are dominated by their geographical surroundings, their cultural traditions, their economic activities, their social character, and their stage of development.

The two main geographical factors that affect the rise and growth of cities are their general setting and their local site. (See Fig. 15·2a and b.) Nowadays the setting is probably more important than the site

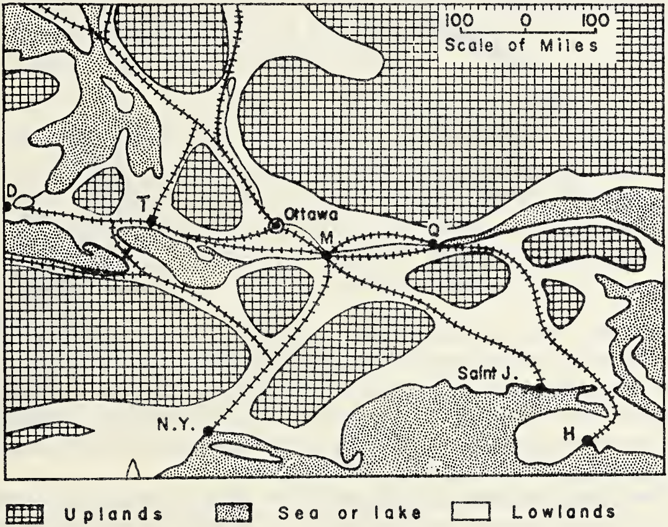

Fig. 15·2a. Sketch-map of the general setting of Ottawa, on the edge of the Canadian Shield and the St. Lawrence lowlands. It is almost equally accessible from the continental interior (W. and N.W.) and oceanic connections (E. and S.E.). It is also a little more withdrawn from the frontier and closer to the heart of the country than Montreal (M), and Toronto (T), and more centrally located than Quebec (Q). Nearer to the Maritimes than Toronto, it is closer to the Prairies than Montreal, and better serves these remoter parts of the country than any other site in the central provinces.

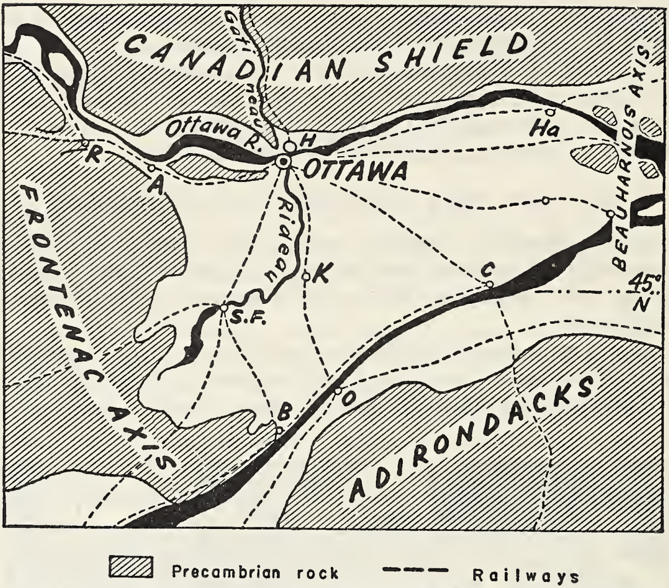

Fig. 15·2b. H-Hull; R-Renfrew; A-Arnprior; S.F.-Smiths Falls; C-Cornwall; B-Brockville.

Sketch-map of the regional setting of Ottawa commanding the basin between the Shield and the Adirondacks and between the Frontenac and Beauharnois axes. The local site is conditioned by the meeting of the upper Ottawa, Rideau and Gatineau rivers, and by the two "prongs" of Precambrian rock that approach Ottawa-Hull from north and south and are responsible for the Chaudière Rapids just above these cities. The wide plain below them is both a natural storehouse of wealth and a prominent crossways of routes.

in that modern transportation has collapsed distance and made the wider region more influential than the local neighbourhood while, at the same time, modern engineering can usually adjust the local site to the needs of the community. Nevertheless, both are significant, and there are many examples where a splendid local site has made its own region or where a poor site has spoiled a good setting.

The Situational Factor: the General Site. The general situation of a city controls the extent and the kind of contacts it has with its neighbourhood and region. Typical situations giving rise to cities are outposts, gateways, junctions, and terminals.

Outpost situations may be outposts of land against sea, or plains against mountains, or the "sown" against the desert. They generally give rise to military or naval towns. Indeed, often they have no other significance than to guard the approaches to a country. (See Fig. 15·3.)

In Canada, Esquimalt on the west coast is an outpost site guarding the sea-lanes into Victoria and Vancouver. It is not situated so that the port has any commercial value. The old French naval outpost of Louisburg, similarly, never had much significance for trade, nor does the modern defence establishment at Placentia in Newfoundland. This is set far out from America in order to protect the Atlantic approaches. Halifax, however, combines both defence and trade functions as Canada's chief outpost on the Atlantic.

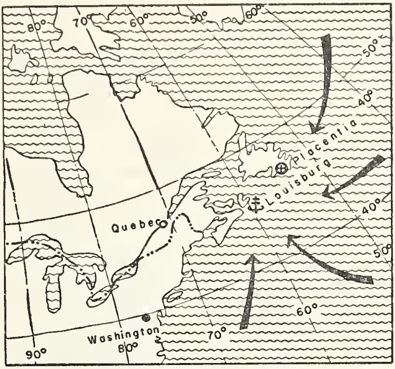

Fig. 15·3. Outpost sites, Canada. Louisburg, chief naval outpost of French colonial days, guarded all entries to the heart of Canada. Placentia Bay, one of the chief U.S. naval bases, guards all approaches from the E. and N.E.

In the far north air stations have been built mainly for defence. They cannot have any commercial use because they are often blocked in by ice. Their main civilian use is to provide weather information. Canada's most northerly outpost is Alert on the tip of Ellesmere Island.

In Britain, naval outposts are Plymouth, Milford Haven, and Scapa Flow. In that country, several cities owe their origin to having been outposts of the plain against the mountain. The Romans, and later the English, had a difficult time in subduing the Celtic people of the mountain fringe. Cardiff was built as an outpost against incursions from the Welsh mountains into south-west England. Chester had the same function for the north of Wales. (See Fig. 15·4.) Long ago they acquired other functions, as the mountain and the plain became united.

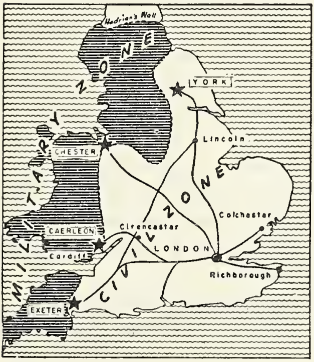

Fig. 15·4. Outposts towns of Roman Britain were on the strategic front between the Civil Zone of settled, civilized Britain, and the Military Zone of occupied Britain. Most of these outposts guarded important passages to the outer fringes of the country, leading from the centre at London. They were so placed as to separate the Celtic refuges in the uplands of Cornwall, Wales, and the Pennines.

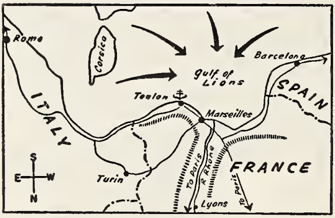

Fig. 15·5. Sketch-map showing contrast between Toulon as an outpost base and Marseilles as a gate town. Toulon is as far out on a peninsula as possible, guarding the sea approaches; Marseilles is as near the mouth of the Rhone and the Rhone gateway to Paris as possible, a railway as well as an ocean terminal.

The French have various great outposts to protect the sea approaches to their country. Brest, at the extremity of the Breton peninsula, is one. Toulon, at the outward bulge of the French Mediterranean coast, is another. Note the contrast between the situation at Toulon, a major naval base, out at the tip of the peninsula, and Marseilles, a major port, in on the flank of the bay on the delta of the Rhone. (See Fig. 15·5.) In North Africa, the French have several outposts of the sown land and a sedentary population against the desert and its nomads. Such are Tuggurt and Figig in Algeria.

Gateway situations occur, typically, at the heads of estuaries (or the sea gates of a country) and at the heads of passes or river crossings (or the land gates of a country). These sites are usually well back of the outposts and are not primarily for defence. However, if the outposts are destroyed, then the gateway towns must make the last stand, and consequently they are well fortified. Their main function, however, lies in being centres of entry and egress, as commercial and immigration centres. The great fortress of Quebec guards the St. Lawrence gateway to Canada. But, although the defence function of Quebec has been important on a few occasions, as for example after the French lost their outpost at Louisburg, its chief activity has always been as a major commercial centre, clearing goods, people, and mail coming into or going out of Canada. (See Fig. 15·6.)

Windsor is Canada's land gate into the heartland of the continent—the American mid-West. Here Ontario penetrates far into the United States between the Upper and Lower Great Lakes, and one or two gateway towns have grown up along the short river frontier to draw together American goods, immigrants, and tourists, and to export Canadian ones in return. (See Fig. 15·7.)

Britain has a goodly number of gateway cities. These are usually placed behind the outposts. Thus there is the busy gateway of Southampton, behind Plymouth; of London, behind Dover; of Bristol, behind Milford Haven, and so on. Mention has already been made of Marseilles, the gateway to southern France, sheltered behind the protection of Tou-

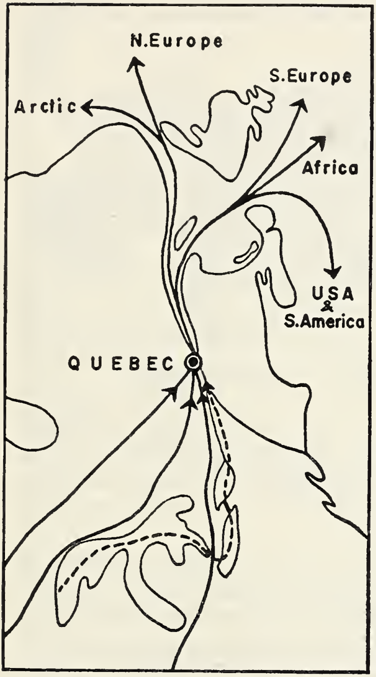

Fig. 15·6. Diagrammatic sketch stressing the role of Quebec as a sea-gate town, collecting the routes from the interior and focusing them on the Gulf of St. Lawrence and the Atlantic Ocean. The sketch is drawn so that standing in the heart of Canada one is looking outwards through the sea gate to the Atlantic and its connecting seas and oceans.

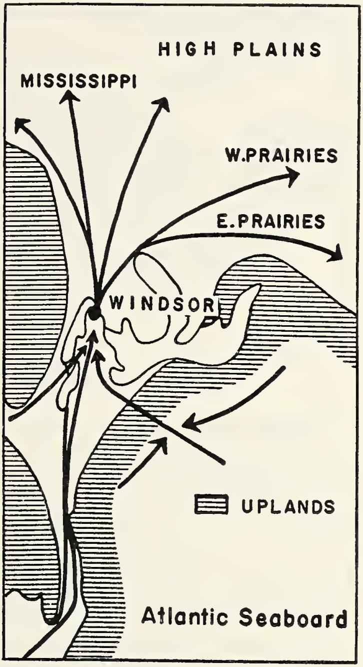

Fig.15·7. Diagrammatic sketch stressing the role of Windsor as a land-gate town, opening up the continental interior to Ontario, Quebec, and the Maritimes; and to New York to a limited extent. The sketch is drawn so that standing in the eastern part of Canada one is looking inward through the land gate to the heart of the continent. This is the view that presented itself to Canadian explorers and early settlers.

lon. Another example would be Nantes, gateway to the Loire, protected by the naval outpost of St. Nazaire.

Within Britain itself, Carlisle and York are gateway towns funnelling routes north to Scotland around the Pennines and in gaps through the southern uplands of Scotland. Similarly, Mulhouse at the Belfort gate, and Lille at the Flanders gate, are other significant commercial centres channelling French contacts with Germany and the Lowlands.

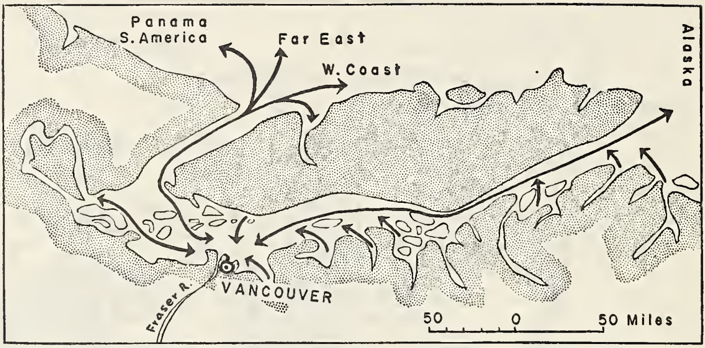

Fig. 15·8. Diagram of Vancouver as a hub of waterways.

Junction situations occur where several land, water, or air routes converge and part. Most of our large cities have this setting. One of the chief functions of a city is to exchange goods. Junction sites offer the best chance of bringing in goods from different quarters and exchanging them at the central point.

Junctions of water routes occur where two or more arms of the sea, or lake bodies, or rivers meet. Vancouver is, amongst other things, a junction site, where the Straits of Georgia, the Juan da Fuca Straits, and Puget Sound converge. (See Fig. 15·8.) Winnipeg grew up at the junction of the Assiniboine and Red rivers, and Montreal, at the confluence of the Ottawa and St. Lawrence rivers.

Junctions of land routes happen where some obstruction forces routes to come together. These limiting factors may be physical features such as lakes, marshes, mountains, or deserts, or they may be human features like boundaries. Winnipeg, in addition to being at the junction of water routes, is at possibly the greatest convergence and concentration of land routes in Canada. Here the main transcontinental lines, debouching from widely separated mountain passes in the west and from fairly distant paths across the Canadian Shield, are forced to come close by the narrow corridor of land that exists between Lake Winnipeg and the international border. (See Fig. 10·4.) Land routes are forced to converge on Montreal by the near approach of the Canadian Shield and the Adirondack-Appalachian highlands. (See Fig. 13·2.)

The junction of air routes is not likely to create a city because the volume of trade carried by air is small, but it may add considerably to a site. Thus Edmonton was a flourishing city well before it became one

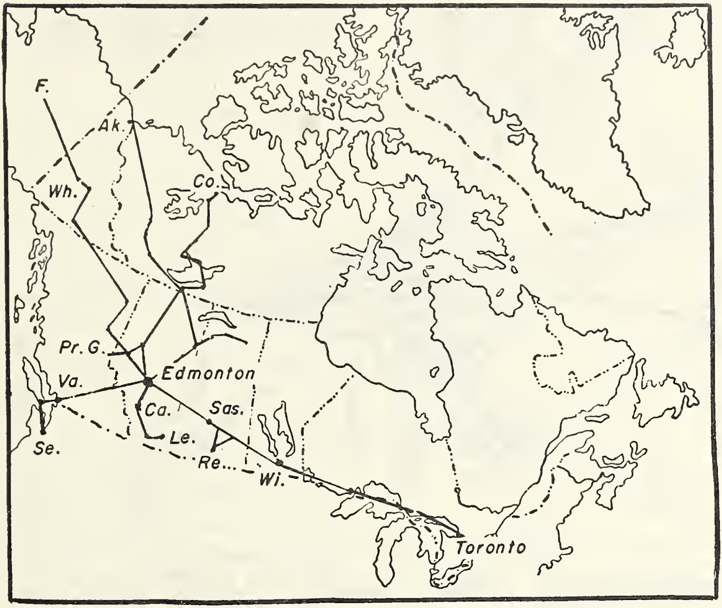

Fig. 15·9. Edmonton: the air hub of western and northern Canada.

of the air hubs of the nation, but now, with trans-Canada routes going east and west, contacting routes going north-west to Alaska and north down the Mackenzie, it has received an added importance. (See Fig. 15·9.) In the east, Gander, Newfoundland, is a great air hub, with lines from Canada and the eastern United States crossing those from Scandinavia, Britain, and France. Its counterpart in the British Isles is Shannon, Eire. However, neither place has grown into a city on the strength of its air contacts.

Terminal situations are found where there is a distinct break of transportation representing the terminus of one system and the beginning of another. The terminus or head of ocean navigation is nearly always a critical point and usually develops a large port. That is the basic setting of Montreal. (See Fig. 15·10, page 262.) Many ships pass Quebec and proceed upstream to Montreal so as to carry their goods as far as possible and thus cut down on the eventual cost of those goods to the consumer. Here ocean going boats lighter their goods into canal boats, of shallower

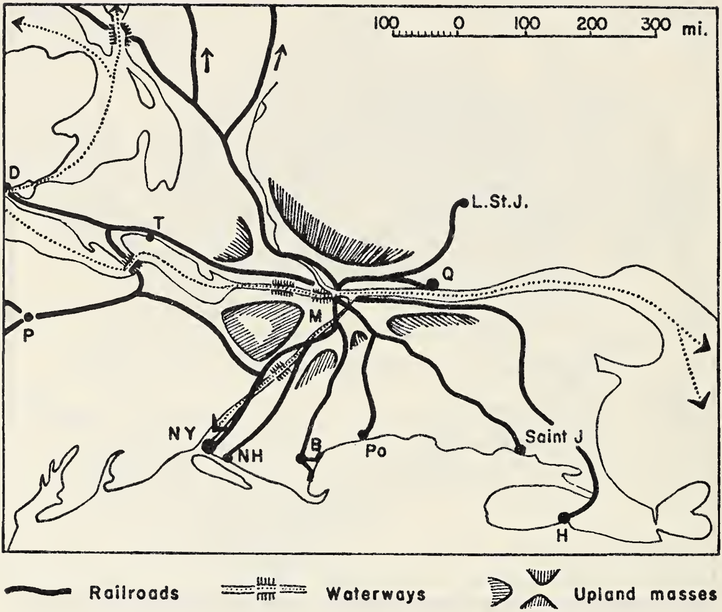

Fig. 15·10. Sketch-map of Montreal, M, as a hub of railroads and waterways. The convergence of river and lowland routes is forced by the near approach of upland masses.

draught, which then take them up the Great Lakes, or else transfer them to trains for inland distribution. However, it should be remembered that special kinds of vessels and services have their own terminals. Large passenger and mail boats use Quebec as their terminal because it offers deep water and also because it offers fast train connections. Were these boats able to go up to Montreal, they probably would not do so because of the *time* lost, such a vital factor for passenger and mail services.

Usually an ocean terminal is also a railway terminal. Looked at in another way, both Montreal and Quebec are terminals for the transport of goods from the interior down to the coast. In the winter, when these ports are frozen in, the railway terminals principally in use are Halifax and Saint John. The C.P.R. and C.N.R. both have their western terminal at Vancouver-New Westminster. In addition, the C.N.R. developed Prince Rupert as a terminal, a port facing the shortest crossing between Canada and the Far East. Churchill grew up as a terminal of the railway from the Prairies to the sea and is at the same time the terminal of the Hudson Strait sea route. (See Fig. 15·11.) Unfortunately this can only be used for about 80 days, during the summer, limiting the expansion of the port and settlement.

Many Canadian rail terminals do not end at the ocean, however. The twin towns of Waterways-Ft. McMurray are at the terminal of the railway connecting the Prairies with the Mackenzie River system. (See Fig. 15·12, page 264.) The end of a railway and the beginning of a road is a situation that has given birth to Grimshaw, commanding the Mackenzie Highway, and Dawson Creek, commanding the Alaska Highway. The end of a railway and the beginning of air services is the situation responsible, in part, for the success of northern terminals like Churchill, Sioux Lookout, Senneterre, and Chicoutimi.

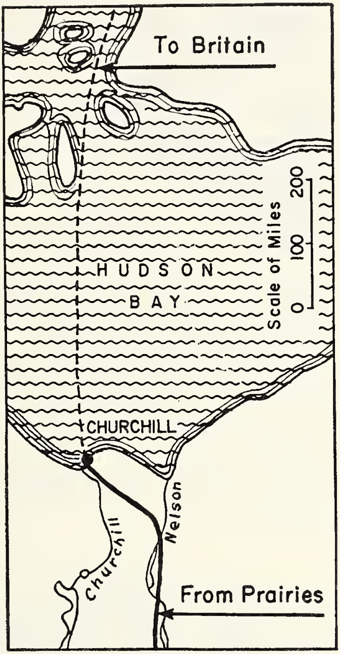

Fig. 15·11. Sketch-map of Churchill, Man., stressing its role as a railway and oceanic terminal clearing wheat from the Prairies through Hudson Bay to Great Britain. Until the establishment of a large army base here, it had virtually no other function.

Some of the major terminals have been at the end of a railway, or of a section of a railway, and the Great Lakes system. Thus Toronto is at one of the eastern terminals of routes from the Prairies and from the Shield where branch lines from the transcontinental routes run down to meet the thriving industrial community on Lake Ontario. Hamilton is situated where two rail lines from across the Niagara frontier and the major line from the Windsor frontier converge upon the head of Lake Ontario.

In Britain, the supreme terminal city is London, which, as has been seen, is the terminal of every major railway company in Great Britain. Lines from the remote four corners of the land have their focus and end there. They do so at or near the terminal of ocean navigation up the

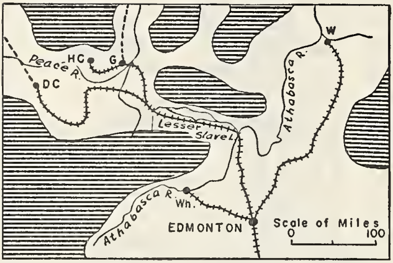

Fig. 15·12. Railhead towns in Canada are commonest along the northern frontier of settlement. Typical are Whitecourt (Wh) on the upper Athabasca; Waterways (W) on the Clearwater, connecting with the Mackenzie Valley navigation system; Grimshaw (G) linking the Mackenzie Highway with Great Slave Lake; and Dawson Creek (DC) linking the Alaska Highway to the Yukon and Alaska. Hines Creek (HC) is the terminal town in the northern Peace River district. (The upland areas, between which the railways wind, are shown by horizontal ruling.)

Thames estuary, and the port of London is one of the great ocean terminals of the world, where many lines from the seven seas have their berths. (See Fig. 15·13.)

In France, Le Havre and Cherbourg are chief terminals for goods and passenger trains taking their burdens to the ships that then put out across the Atlantic.

Combined Settings. It is obvious from this brief survey that most towns and cities are not due to any one set of factors but to a combination of two or three. They have several settings that tend to coincide at that particular point. Thus

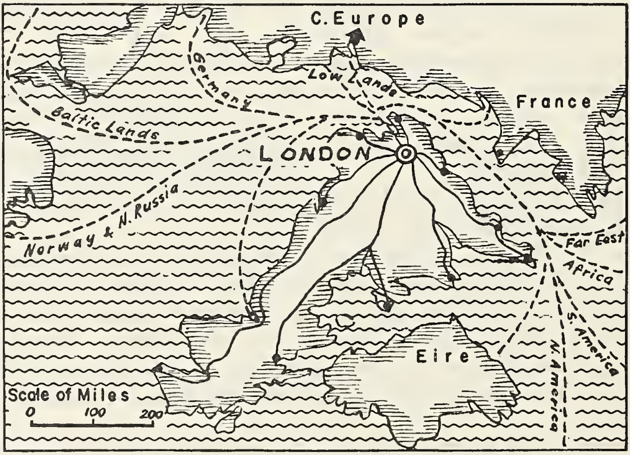

Fig. 15·13. Sketch-map of London, England, as a railway and oceanic terminal commanding the approaches to western Europe from the Atlantic and its arms, and forming a focus of British continental contacts at their shortest. Although this is not the common angle from which to view British-Continental contacts it is, of course, the viewpoint from which those living in Britain look across at the Continent.

London is both a terminal and junction. Paris, one of the greatest junction cities, is a terminal for certain classes of boats moving up the Seine.

Most of the larger Canadian cities combine several situational conditions. Halifax is both an outpost and a terminal; Quebec, a terminal and a gateway; Montreal, Hamilton, and Vancouver are all junctions and terminals; Calgary and Edmonton are gateways and junctions.

SITUATION AND FUNCTION

The situational factor often suggests the main function of a city. Thus outpost cities are usually defence centres. Gateway cities function principally to open the gates to trade and are, therefore, commercial centres. Since junction cities have the best opportunity of assembling raw materials and distributing goods, they tend to be industrial. They are also good administrative centres, as capitals of countries or provinces. Terminal cities have transportation as their chief function but are often in a good position for trade and industry.

QUESTIONS

A

1. Which are the ten most urbanized countries in the world?
2. Why are they so much more urban than other countries?
3. Five of Canada's provinces are more urban than rural. (Fig. 15·1.) Which are they? Why have they become so highly urbanized? Which is the most urban?
4. From the sketch-map in Fig. 15·2a indicate what factors in Ottawa's general situation or wider setting have helped to make it important.

B

5. Look at the sketch (Fig. 15·2.) giving the salient features of the local site. Is there anything in that site which would have prompted the rise of a national capital?
6. Which might be considered more important: Ottawa's situation or site? Give reasons for your opinion.
7. Draw a diagrammatic sketch showing the value of Niagara Falls, Ontario, as a gateway town.
8. What factor of the general situation or setting dominates the following settlements: Moncton, Goose Bay, Burnt Creek (or Schefferville, Nfld.), Cochrane, Matapedia (P.Q.), Emerson (Man.), Saskatoon, Medicine Hat, Calgary, Hay River (N.W.T.), Prince Rupert?

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CHAPTER XVI

Urban Geography

THE FACTOR OF THE LOCAL SITE

Within the general setting of a city, it is often the local site that actually determines the location, development, and form of the settlement. Thus in the St. Lawrence gateway, it was the magnificent rock of Quebec above coves suitable for harbours that actually located the city where it is. Along the frontier of the St. Clair River, it was the nearness of Windsor to the great metropolis of Detroit that made it the chief gateway town over such rivals as Sarnia. When the capital of Canada was to be chosen in terms of contact with both the English- and French-speaking groups in the country, it was the site of Ottawa, between Ontario and Quebec and dominating the chief natural node in the Ottawa Valley, that assured its selection. Had a nearby but not so well placed town such as Richmond been chosen, it probably would have been unfortunate.

The local site comprises many geographical factors, including geology, climate, soils and vegetation, water supply, and topography.

The Geological Factor. Local bedrock may influence the location of the city. In the case of Ottawa, the outcropping of beds of resistant limestone and sandstone across the Ottawa and Rideau valleys produced waterfalls that forced a break in transportation and that provided power for industry. The sandstone was well suited for building purposes. (See Fig. 16·1.)

A bedrock foundation is more and more required for the building of skyscrapers. On the other hand, it is avoided by ordinary housing, and the form of a city like Saint John is partly governed by the necessity to avoid the rocky knobs that thrust to the surface. In fact, the pattern of many cities is governed by rock exposure. The shape of Montreal is governed by its triple peaks. In Quebec, there is a marked difference between upper and lower town which is due to "the rock". The shape of Hamilton is an adjustment to the rocky "mountain" that runs behind

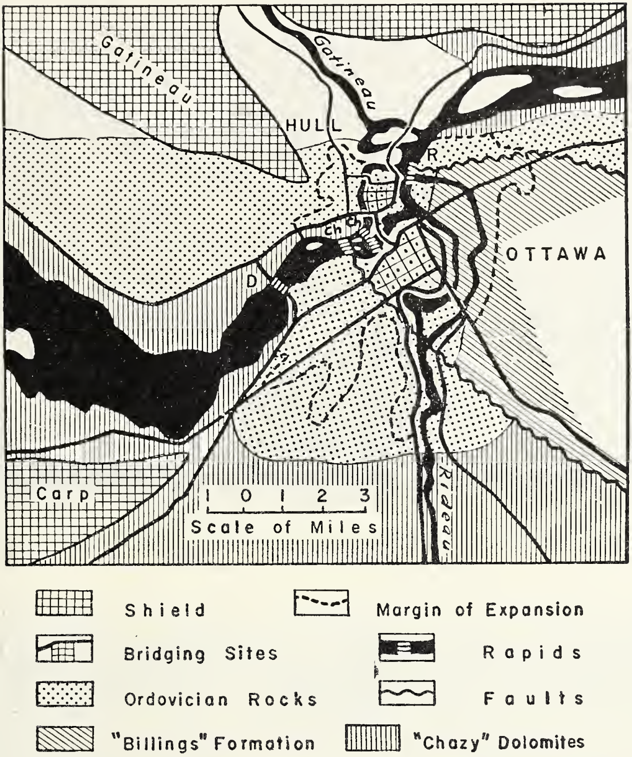

Fig. 16·1. Ottawa: the local site, showing the influence of geology. Ottawa is at the meeting place of three rivers where waterfalls and rapids occur. The Gatineau brings logs for paper mills from the forested shield and affords sites for hydroelectric power. The Rideau, which has been canalized, waters a fertile plain and directs farm produce toward the city. The upper Ottawa, pinched between the Carp and Gatineau prongs of the Shield, is forced over ledges of rock in the Deschenes (D) and Chaudière (C) rapids, providing sources of water power. The lower Ottawa draws together lumber and farm interests from the edge of the Shield and the St. Lawrence lowlands.

Raw materials, power, room for settlement, good local food supply, and excellent communications make a good basis for Hull and Ottawa. Both cities occupy a considerable margin of expansion beyond their earlier nuclei at bridging sites, keeping mainly to the higher ground provided by Ordovician limestones and sandstones. The "Billings" formation, fine black shales of the Ordovician, has been preserved between faults and has long underlain Ottawa's market gardens; it is still a productive part of the lower Rideau valley. The Chazy dolomites, where exposed, provide rather a poor soil. They are, however, mostly buried under glacial debris, which provides a basis for general farming.

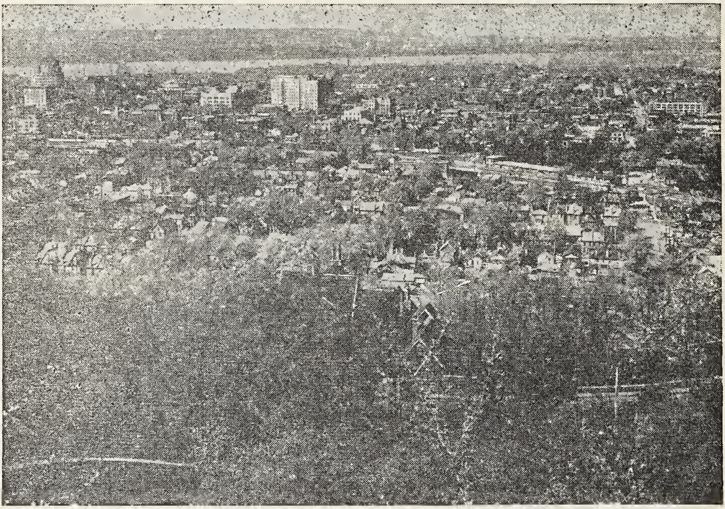

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Fig. 16·2. Air view of Hamilton showing how the Niagara scarp has influenced the shape of the city. (Looking from edge of scarp across long parallel belts of residential business and industrial zones.)

it. (See Fig. 16·2.) The layout of railways, docks, and business sections in New Westminster reflects the steep rise from the river there.

The **mantle material** is just as important, if not more so. Many of our cities are built on glacial till. In the case of Halifax, several drumlins rise above the general level. On one of these is the university; on another, the principal hospital. The drumlin that dominates the others and overlooks the whole of the harbour is crowned by the Citadel. (See Fig. 16·3.) Toronto's form, together with that of Hamilton, is markedly affected by the stranded shoreline of glacial Lake Iroquois. Since the mantle material is relatively even in Toronto, it has been easy to develop a "grid" pattern. In Halifax, where the mantle of drift is very uneven, the grid system is modified by curved roads going around the drumlins.

If the mantle is deep, it is simple to put in underground services like watermains and sewage lines or to construct subways. If it is shallow, then the cost of putting in such services is high. Thus, one of the reasons for the move from the old town at Yellowknife to the new town was to get away from a rocky site to an open, gravelly plain, on which it was possible to lay streets out in a regular grid and install a water supply and sewage system. (See Fig. 16·4.) Winnipeg, on the bed of glacial

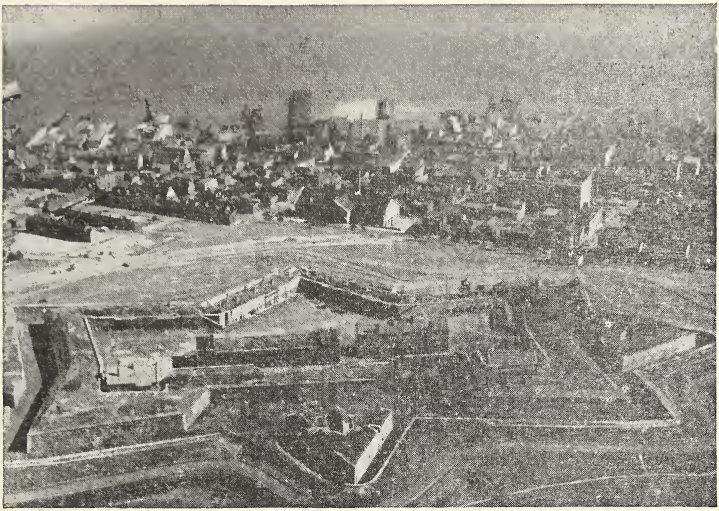

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Fig. 16·3. The Citadel, Halifax, bestrides a large drumlin whose oval shape can be made out here and which crowds the business and industrial section into a narrow steep strip between hill and sea.

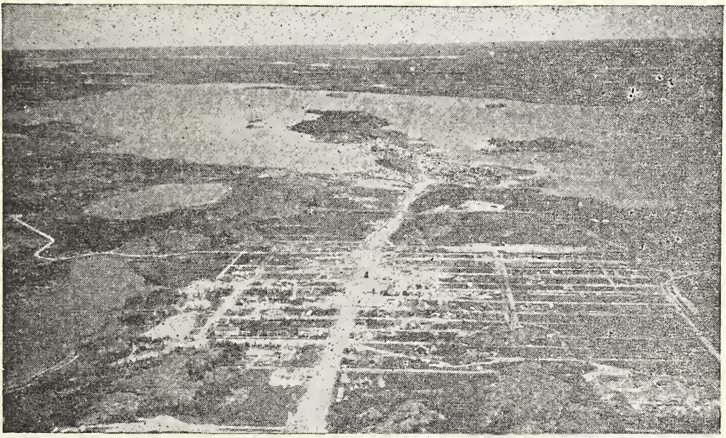

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Fig. 16·4. The old town of Yellowknife, in the far distance, was built on a rocky peninsula far out on the lake. It proved too crowded as population grew and lacked room to expand. A new town, in the foreground, was therefore built on a raised beach further inland with plenty of room for expansion.

Lake Agassiz, has little difficulty in this connection, but St. John's, with its rocky site and thin mantle, experiences not a few.

Local supplies of sand, such as forms part of the mantle in the Ottawa area, are a real asset in modern road transportation. The sand is quarried and spread on icy streets and highways to facilitate movement and to prevent accidents. Similarly, local beds of clay, suitable for making bricks, are very valuable, although their lack would not prevent a city rising. It might make the city one of frame houses, however, with a very different character.

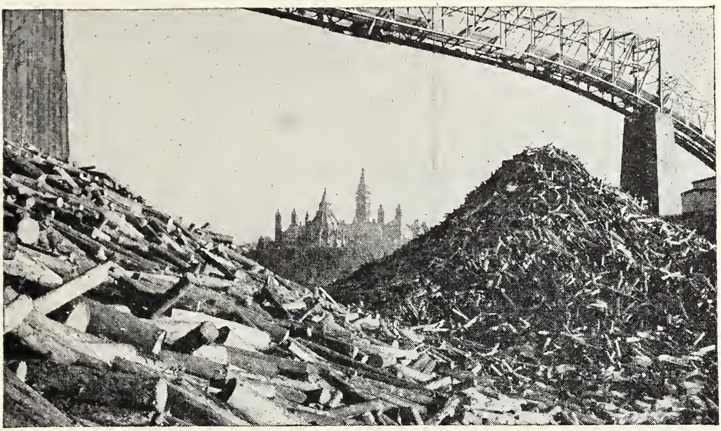
The Climatic Factor. This is somewhat more difficult to measure, especially since our knowledge of local climates is not always clear. Certain things are evident. The long, cold winters of eastern Canada freeze up the canals and the estuary of the St. Lawrence system. Therefore, cities which might normally have depended throughout the year on water transportation have to rely on road and rail during the winter. Consequently, they must provide an unusually large space for a dual development of water and land transportation. In many cases, where bulk cargo is moved—cargo such as iron, coal, limestone flux, chemicals, and logs (for pulp and paper)—water transportation is much cheaper. Instead of bringing in these commodities by train or truck in the winter, many industries assemble the whole year's supply in the summer. This means that the cities must set aside extra space for coal dumps, log piles, and similar bulky materials. These vast mounds of materials are very conspicuous in the Canadian scene, though absent or much reduced elsewhere. (See Fig. 16·5.)

The closing of the harbours of Montreal and Quebec in winter is the great opportunity for Halifax and Saint John, because these are ice-free ports. This climatic fact is of inestimable importance to them.

The **prevalence of fog** at certain seasons in St. John's and Halifax impairs the use of these ports, but it is not sufficient to offset the very real topographic and other advantages offered by the sites of those two cities. The wonderful shelter their harbours provide during storms is undoubtedly a major factor in their success.

The local distribution of wind and frost in many of our cities profoundly affects the details of the urban pattern. In Hamilton, for example, where the prevailing winds are from the south-west, the better residential areas are in the south and west so as to be clear of the smoke nuisance created by the coke ovens, blast furnaces, and steel mills of the city. The smokiest works are all in the north and north-east section of the city, and fortunately, most of their smoke is blown out to the lake.

In the same city, deep ravines cut their way to the shore. These are sometimes quite flat at the bottom and might be considered usable



Malak, Ottawa

Fig. 16·5. Air view of the pulp and paper works below the Chaudière Rapids, Hull, showing the vast space required for storing wood logs against winter operations.

from the topographic point of view. However, they are bad "frost hollows" in the winter, where heavy rime and damp fog accumulate. Consequently, they have, in the main, been avoided.

The Canadian climate is one of marked **spring floods**, due to the rather sudden thawing of the winter snow and the simultaneous onset of spring cyclones and early summer thunderstorms. Cities like Calgary, close to the mountains, are especially affected, or those like Winnipeg where the upper part of the river (in the south) melts before the lower part (in the north) is clear of ice. River junction sites, like Montreal and London, may be somewhat of a liability at the flood season. The cities concerned act accordingly, and often their pattern of main streets, factories, warehouses, shops, and offices is governed by the need to be away from recurrently flooded areas.

East of the Rockies, the spring and summer floods are generally followed by a **period of deficient rainfall** and even of drought during the late summer and early fall. The tendency of small rivers to dry up creates serious problems for city industries and sewage disposal systems. Consequently, not a few cities, like those in the Grand River valley, construct weirs to pond up the river and thus gain a steadier supply of water. The building of these weirs affects the pattern of settlement.

The Factor of Water Supply. Modern cities use a truly enormous amount of water. Whereas in the country a million people would be spread over a large area and their demand for water could readily be met from local springs, wells, or streams, in a city, these same people would have to get their water in a few square miles. Unless the city happens to be on the edge of a fresh water lake, it probably cannot draw all the water it needs from its own immediate locality but has to assemble it from a wider area. Its ability to do so may well affect its growth and prosperity. Where it is unable to get an adequate supply, it stops growing. One of the more serious limitations on the growth of a city like London, Ontario, is its water supply. The problem in London, England, is much greater still. Some of the larger English cities derive their water from a great distance, as for example, Birmingham from Wales, or Manchester from the Lake District. New York has to go even farther afield to the Catskill Mountains. The problem of finding more water for any further increase in population is a crucial one. It is another reason why there is now a marked tendency towards decentralization and the setting up of new industries in smaller centres.

The Factor of Vegetation. Although soils and vegetation are not now of much significance in locating settlements, they have been in the past. They may help to explain the rise of certain historic cities which have since grown and flourished independently of that initial impulse. In early times, heavily forested areas or areas with swamp vegetation were avoided, and settlement concentrated on the more open areas. In Europe, the more open land lay on loess, limestone, or chalk plains or sandy old sea beaches, and these were favourite sites. However, the treeless steppes were difficult to build on when houses were made chiefly of wood, and cities did not develop on them for quite some time.

The **meeting place of major vegetation zones** is a good location for a market centre since it can draw on the produce of two or more worlds. Thus, along the edge between the desert and the steppe, or along the front between the steppe and the forest, or on the division between the deciduous and coniferous forest, cities have long grown up. A good example of this is found in Russia. Leningrad owes a good deal to being on the edge of both the coniferous forest, from which it derives timber, pulp, and other forest products, and the deciduous forest zone which, when the trees are cleared away, provides good farm land for flax and dairy farms. Kiev, on the border between deciduous forest and grassland, lies on the junction of zones of general farming and grain farming. Moscow, accessible to coniferous and deciduous forest and to grassland, has been a good market for the products of all three belts of country.

In Canada, a number of towns on the northern edge of the Prairie are also near the forest and benefit considerably by being able to exploit both forest and farm economies. (See Fig. 16·6.) This is also true of Three Rivers and Ottawa in the east.

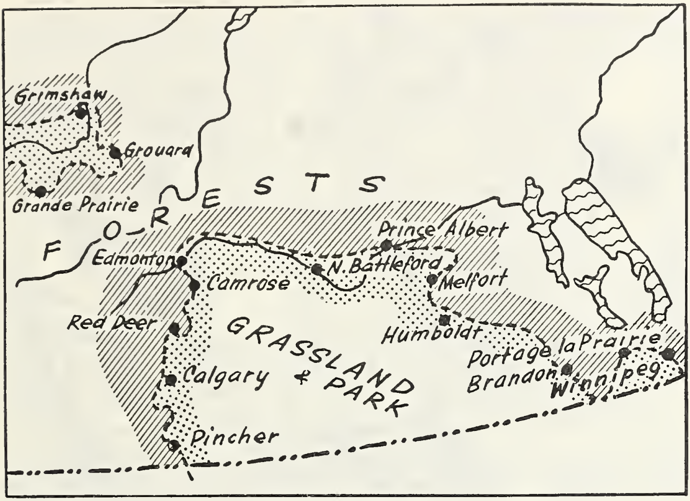


Fig. 16·6. Prairie-forest towns along the edge of the open and wooded plains in western Canada. Many of these towns share in both the activities of the forests behind them and of the croplands (which have replaced the grasslands) before them.

The Topographic Factor. The detailed relief of the land, in addition to its general build, has probably the single greatest influence on the location of cities. Sometimes it works in league with drainage or vegetation or some other factor. Sometimes it is so dominant as to be the only one that counts.

In early times, its relation to drainage was especially important. Topography which produced springs or artesian hollows in dry areas nearly always invited the rise of settlement. In this way, *wet point* towns arose, which were centres with an exceptional supply of water in a relatively dry area. Around the edges of the Arabian and African deserts and of the dry Spanish or Mexican mesetas, such towns developed, especially where the springs could be used for irrigation or where they formed natural oases. Here all routes would converge; the caravans would plod in from the desert and unload their wool and carpets; a natural market would emerge; trade and industry would thrive, and the population would grow.

Similarly, topography which produced dry uplands or knolls in the midst of fens or flood plains sponsored settlement. *Dry-point* villages and towns grew up on these well drained locations above the prevailing

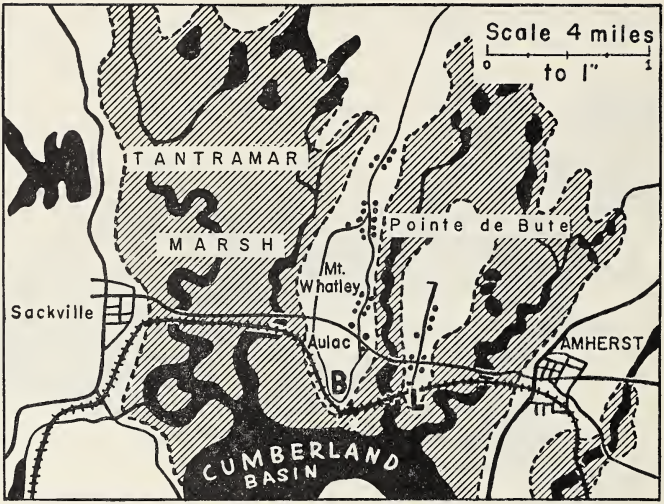
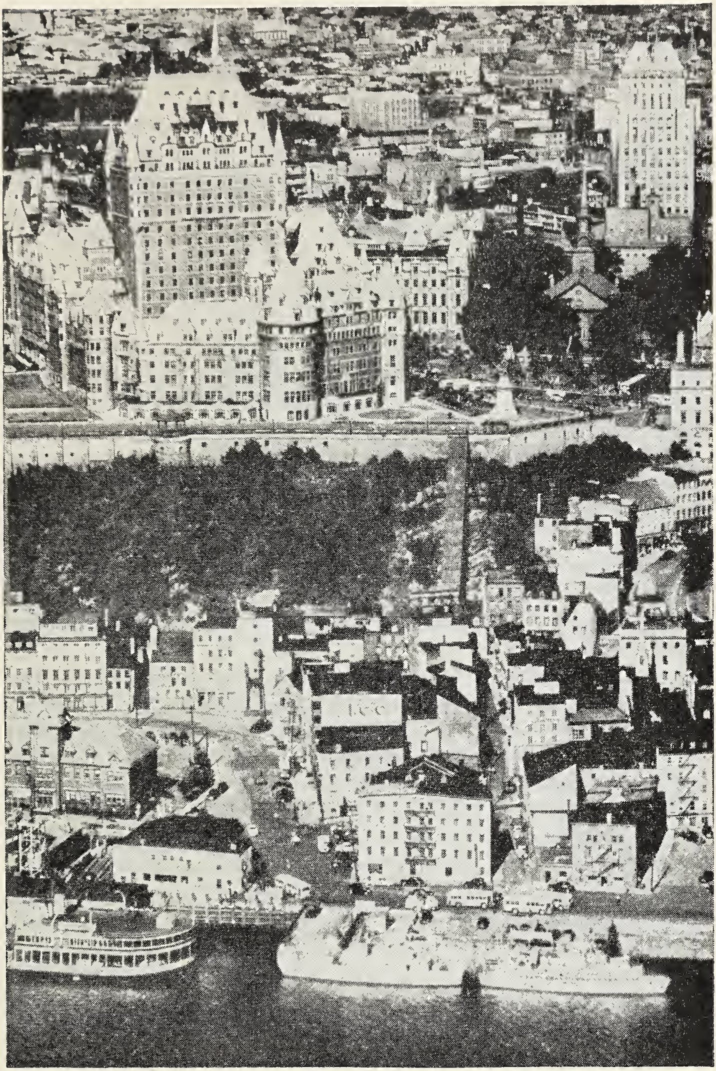


Fig. 16·7. "Dry-point" settlements in the Maritimes. Between Amherst and Sackville stretch the Amherst and Tantramar marshes. Rising above them are two low ridges, the Fort Lawrence ridge, an island of dry land, and the Fort Cumberland ridge, a long peninsula of dry land. On these the British built Ft. Lawrence (L) and Ft. Cumberland, formerly Ft. Beauséjour (B). The villages of Aulac, Mt. Whatley, and Pointe de Bute are typical "dry-point" sites.

swamp or the recurrent flood. Such were the cities of the Dutch dunelands above the *polders.* Such, too, have been the cities of the high levees of the Mississippi flood plain. Canada does not have very good examples, but Sackville, New Brunswick, and Amherst, Nova Scotia, on either side of the Tantramar marshes might be cited, together with the villages lying between them. (See Fig. 16·7.)

True wet-point and dry-point cities do not have much room to expand without running out into the desert or the marsh, and consequently, they tend to become densely packed with narrow streets and tall buildings. If they grow at all, it is upwards, into the air. Long before New York had its skyscrapers, the oases cities of Arabia possessed tall, sky-raking, multiple dwellings.

Hill sites are very common locations for cities. This was more particularly the case in the days when cities had to consider their defence and the protection of the countryside. Then it was virtually a necessity to find a conveniently located hill in the valley or plain which the city served. Otherwise, cities had to fortify themselves by the very costly



QUEBEC Ciné Photography

Fig. 16·8. Air view of Quebec City taken from above the St. Lawrence River. The Chateau Frontenac stands on the bluff high above the houses and streets of lower town.

procedure of building walls and even making an artificial hill on which to set their citadels and towers. Today, the tendency would be to avoid hills because they interfere with the development of terminals, industrial plants, and the business sections of cities.

When the need for defence has passed, hill-top or hill-side cities usually spread down into the valley. Sometimes a virtually new city arises; the new commercial centre down on the lower land replacing the older one, the new residential areas, with a far more roomy layout of streets and homes, replacing the tightly jammed houses and steep, narrow lanes of the old city.

That is, of course, precisely what has happened at Quebec, one of the best examples of a hill-top city. (See Fig. 16·8.) The French, in need of a defensible site at the mouth of the St. Lawrence, built their citadel on a part of the massive rock. The rest of the rock was used for an upper town, including government buildings, cathedral, and university. A lower town was started, but it remained small. However, after all threat of war had passed from the continent, Canadians developed the city as a great port and industrial centre. Then the lower town spread until it became the main shopping and working centre, with the railway terminal, docks, and factories. The old town is very compact, with tall, crowded buildings compressed behind the defensive walls. The steep slopes of the site modify the physical pattern of the city. The street pattern is rather like an irregular spiral, partly climbing up and partly swinging along the contours.

Even in a city like Montreal, where an attempt is made to have streets run right up from the harbour to the Mountain, the tendency at the higher levels is for them to loop around the peak, with the contours dominating. In this case, the heights are not used for defence but form the best residential area of the city, and there is a definite social zoning that follows the altitudinal one. (See Fig. 16·9.)

An **escarpment site** definitely affects the rise and shape of cities. Escarpments represent a sharp rise from a world at one level to a world at another. In some cases, the two worlds are quite different as, for example, between the Niagara fruit belt below the Niagara escarpment and the general farming belt above. In this situation, there is a very good opportunity for a market town to arise to exchange the products of the two levels and bring their different interests together. Furthermore, rivers may tumble down the scarp in falls that can be turned into power. Therefore, industries often arise, using the varied agricultural raw materials of the region.

All along the Niagara escarpment, there are towns wherever there are important re-entrants or gaps in the hill face allowing roads, rail-

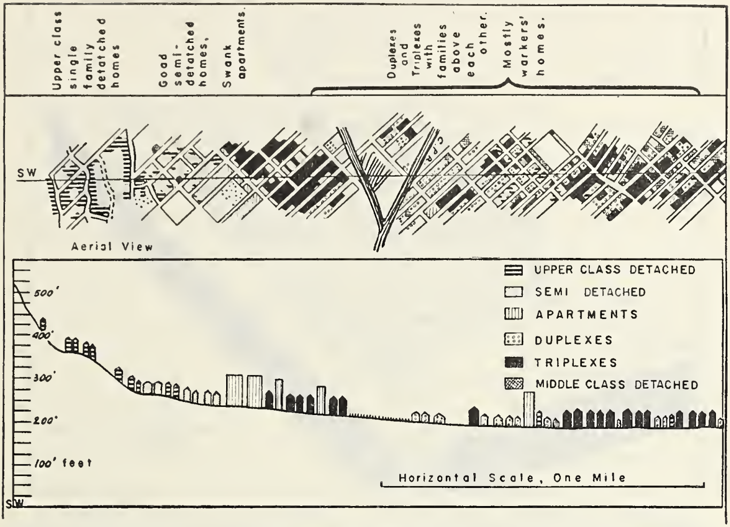


Fig. 16·9. In North American cities, residential zones frequently correspond with altitudinal ones as in Montreal. The upper diagram shows the horizontal plan, the lower one the vertical distribution of housing, with an advance from triplexes, through duplexes to semi-detached villas and detached mansions. This progression is interrupted by swank apartments above the railway tracks and by working-class apartments or tenements below. (After P. Camu)

ways, and even canals to climb from the central Ontario plain to the dip slope of south-west Ontario. Thus St. Catharines at the Twelve Mile re-entrant and Hamilton at the Dundas re-entrant have grown to be busy commercial and industrial centres. In both cases, the edge of the plateau has determined the layout of the city. Both are latitudinal towns, stretching east and west along an axis that parallels the scarp. Short, steep streets cross the axial ones, running from the lake up to the edge of the scarp where hairpin loops or cuts climb to the cuesta. Duluth, between Lake Superior and the escarpment above, has much the same pattern.

In the Prairies, the Manitoba Scarp and the Missouri Coteau also show instances of towns growing up in a re-entrant carrying road and rail from one level to the other. They include Brandon, Dauphin, and Swan River, Manitoba; and Moose Jaw, Saskatchewan. Oblong rectilinear patterns develop.

Riverine sites generally offer most room for cities to expand, enable routes to meet there at the lowest gradients, and support the densest

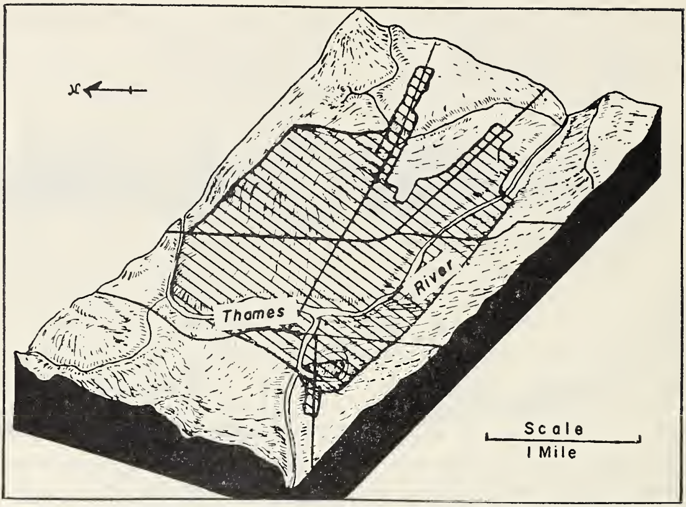


Fig. 16·10. Simplified block diagram of London, Ont., showing influence of river and morainic heights on city.

population. Therefore they are the sites of our principal cities, other than those developed along lowland coasts. The physical features of the valley plain effect the minimum control on the urban pattern. Consequently, an artificial pattern, like the grid system, or a nodal pattern, depending on radiating roads and stellar in shape, will develop.

However, the **course of the river** itself may decide where the city is located and how it grows. A natural focus for the plain is formed where two or more rivers meet. A city springs into being as a **ford** or **bridge** site, as did London. (See Fig. 16·10.) The roads and railways accommodate themselves to the Y-shaped lines of the watercourses.

The cycle of river erosion also plays an important part in shaping city development. Towns on a **youthful** or **rejuvenated** plain are interrupted by profound creeks with sharply sloping banks. The patterns then tend to follow the **lay of the interfluves**. The youthful or rejuvenated streams often supply waterfalls and rapids. They therefore invite the use of their valleys by industries. The interfluves above, which are broad and flat, are used by the chief commercial and residential areas. In a terraced valley, the lower terraces, between which dams or weirs may be thrown in order to develop power, are good sites for heavy industry. Light industry is found on the intermediate levels, and residential zones cling to the higher terraces above the nuisance of traffic, smoke, or flood.

Towns in a mature plain follow the **lay of the valleys.** The interfluves are low and not important. The valleys are wide and have room for industry, commerce, and the bulk of the residences. The better homes may be on the low swells above the broad vales.

If the river is broad, if it loops widely on itself, or is split by an island, a settlement may grow up with a **double** or even a **triple core**. Thus Ottawa and Hull, Quebec and Levis, have two core areas, although they form one urban community. (See Fig. 16·11.) Winnipeg and St. Boniface are, similarly, two cities in one; as are the famous twin cities of Minneapolis-St. Paul. In Paris, the central island has the Notre Dame Cathedral and important government offices; the north and south banks, their own separate urban cores and characteristics. In Montreal, the same situation is developing. There the island is the main core of the urban region, but core areas of separate communities are developing on the south and north shores.

Coastal lowlands are major sites of city development, especially in countries like Canada that depend so much on the transport of their great lakes and on their overseas trade. The topography of the coast is

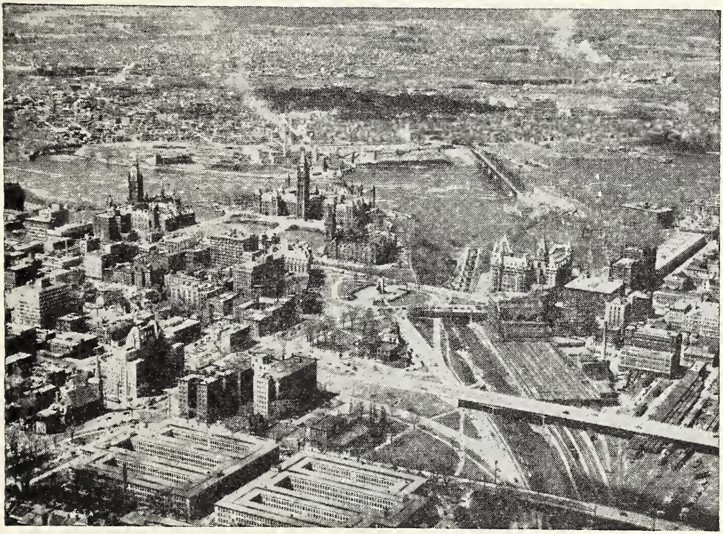


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Fig. 16·11. River towns usually spread to both sides of a river. Should the river be broad or interrupted by rapids or should it act as a political boundary, two separate cities may grow up and the built-up area will thus possess two distinct cores. This is the case with Ottawa and Hull.

of first importance. A **fault coast** does not usually offer good harbourage or provide suitable ports. The land ends too abruptly; the sea is too deep and unprotected. However, a very gently sloping shore with very shallow seas off the coast is also ineffective. Such are **delta coasts** or **emergent coasts**, where the coast plain is slowly rising out of the sea. Such coasts may have a fertile interior, but they usually have too many shoals and shifting off-shore bars to permit a good approach from the sea. It is often the case that deltas of great rivers are not themselves good sites for ports. Either the port is built on firm ground on the levees of the river above the delta, as in New Orleans, or it is developed on the side of the delta as in Vancouver, Marseilles, and Calcutta.

Ria, karst, and **fjord** coasts make excellent harbours providing good shelter from storms. But they do not always produce good ports because their hinterlands may be very hilly or rather infertile.

The most favoured coasts are those made up by the **estuaries** of **drowned rivers**, such as the drowned St. Lawrence, Hudson, Delaware, and Chesapeake estuaries. Here the broad, deep estuary provides excellent harbourage, and the good connections upstream to fertile, populous lowlands develop good ports.

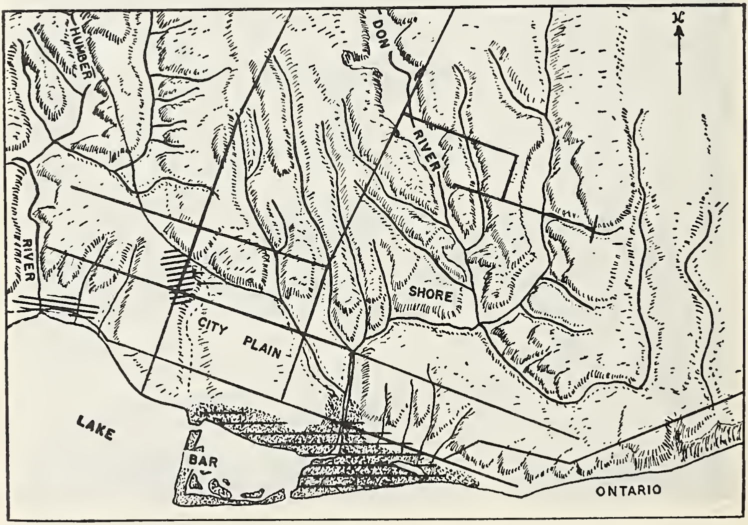

Fig. 16·12. Diagram of Toronto, showing the influence of river valleys and beach terraces, especially on industrial areas (ruled lines). The Humber and Don valleys have eaten deeply into the old glacial Lake Iroquois terrace. The Iroquois shore marks a drop to a lower terrace which is the business and industrial part of the city.

The form which the ports and the cities behind them take may well be conditioned by the **cycle of coastal evolution**. Towns on a **youthful coast** tend to have a linear pattern, following the sweep of the shore between the sea cliff and the beach platform. Often the streets rise tier on tier. Such would be many a town on the Nova Scotian or Gaspesian coast. Towns on a **submature coast** have a crescentic pattern extending around the filled-in bay between the sawed-off headlands. Behind this, a stellar pattern develops as the town grows out along radial roads across the flat open plain into the hinterland.

Toronto, which is a combination of a river and coastal town, straddling rejuvenated creeks and fronting a submature coast, has an interesting combination of patterns. (See Fig. 16·12.) There is the crescentic water front, heavily industrialized; the latitudinal streets aligned to the old stranded beach of glacial Lake Iroquois; the grid system on the fairly broad interfluves, where the main commercial and residential areas are; and the interrupted irregular pattern along the edge of the Don and the Humber rivers, bordered by industry.

Most cities are like this, a combination of several site factors. The pattern of the city reflects the topography in many respects so that, in effect, settlement becomes a fine indicator of the geography of the land.

QUESTIONS

A

1. Show how the local site of Ottawa has influenced (a) road patterns, (b) bridge sites, (c) urban expansion. (See Fig. 16·1.)

B

2. In the course of the Great Lakes-St. Lawrence system, which towns have arisen as bridging sites?
3. In Canada, where have the forks of important rivers produced towns?
4. On what kinds of coast are the following ports situated: Lewisport, Nfld.; Newcastle, N.B.; Port Alfred, P.Q.; Port Hope, Ont.; Port Nelson, Man.; Aklavik, N.W.T.; Squamish, B.C.?

C

5. Give examples, other than those in the text, of Canadian towns controlled (or strongly influenced) by (a) bedrock, (b) a pronounced feature of relief, (c) glacial drift, (d) glacial-lake or marine terrace, (e) climate.
6. Give examples, other than those in the text, of dry-point and/or wet-point settlements in Canada.

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CHAPTER XVII

Urban Geography

PURPOSE AND PLACE

Although the location of a city may be influenced by its physical setting, it also results from the economic or social reasons for which that setting was chosen. Thus the purpose a city is set up for largely determines the site it will select, and it may be classified accordingly.

Defence settlements choose sites flanking important approaches to the country. They are located according to **the threatened frontier of the time**. When Canada still felt itself threatened from the south, its principal fortresses were on the St. Lawrence estuary, at the gaps in the Appalachians, and at the crossings of the St. Lawrence, Niagara, and St. Clair Rivers. Quebec has already been mentioned as a citadel. Fort Henry on a high hill above Kingston was also important, guarding the St. Lawrence River and lower Lake Ontario and the route across the Rideau hills to the Ottawa Valley: it was the hinge site connecting Upper and Lower Canada. Kingston still retains its proud military tradition and is the site of Canada's premier defence college.

Subsequently, when the international boundary became demilitarized, the chief threat to Canada seemed to be from Europe across the Atlantic, and the defences of Halifax were strengthened. It became the chief base of the Canadian fleet and played an important part in both World Wars. The great basin widening out behind the fortified narrows enabled large convoys to gather before setting out across the Atlantic.

During World War II, the Pacific frontier became threatened also, and the naval base of Esquimalt, west of Victoria on Vancouver Island, guarding the western approaches to Canada, assumed importance.

Long-range bombing by air was developed towards the end of the war and North America realized, in the words of General Spaatz of the U.S.A.A.F., that it was "wide open at the top". Thus the north, which had been almost completely neglected for defence purposes—as for any other—suddenly became significant. Great air bases were set up at

Whitehorse, Churchill, Resolute, and Goose Bay to protect the approaches over the Arctic. (It will be recalled that the shortest routes of all from Europe and Asia are via the Canadian Arctic.)

Thus the changing human situation has led to recurrent reinterpretations of the physical geography of Canada for defence purposes, and as new functions have been developed in defence—particularly the function of the air arm—new sites have been chosen or have been given fresh importance. (See Fig. 17 1.)

Administrative purposes have seen a somewhat similar change and, as a result, have led some sites to supersede others. Mr. Cornish remarks on the fact that many capitals are placed, not in the centre of the country, but in a forward position close to the chief frontier; that is, the

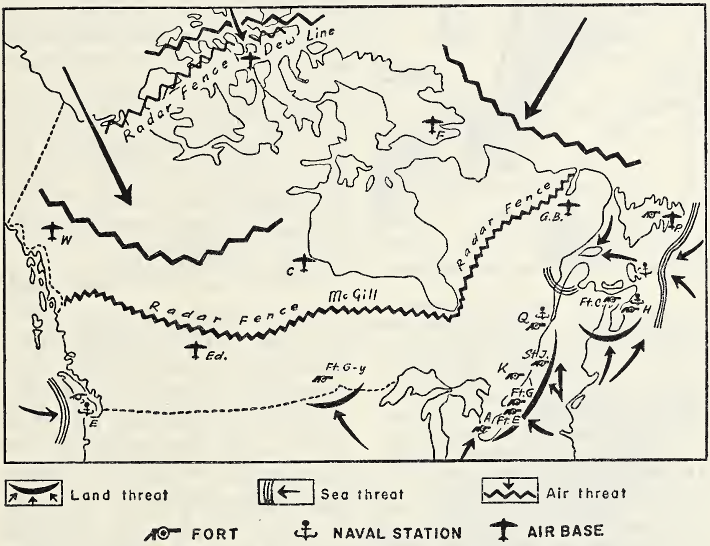

Fig 17·1. Canada's changing pattern of defence. In the eighteenth and early nineteenth centuries the chief threat was by land from the south; the chief defence settlements were along the southern border: H, Halifax; Ft. C, Ft. Cumberland; Q, Quebec; St. J, Ft. St. John; K, Kingston; Ft. G, Ft. George, Niagara-on-the-Lake; Ft. E, Ft. Erie; A, Ft. Amherstburg; Ft. Gy, Ft. Garry, Winnipeg. In the early twentieth century the chief threat was or might have been by sea from the east, and those bases on the east coast suitable for redevelopment were enlarged: Halifax and Quebec. E, Esquimalt, on the west coast, was also established. Today the chief threat is by air from the north, and the new bases have been placed there: R, Resolute; W, Whitehorse; F, Frobisher Bay; C, Churchill; E, Edmonton; G.B., Goose Bay; P, Placentia Bay, U.S.A. The McGill and Dew Line radar fences are given only their approximate location.

frontier most threatened from outside. Instead of being well away from the trouble zone, the capital is placed near to it in order to organize the whole nation, if necessary, in the series of stands that might have to be made to repel invasion. Thus London stands near to the shortest crossings of the North Sea and the English Channel; Paris is not far from the Flanders Gap and the gaps of the Rhine; St. Petersburg, long the capital of Russia, lay at the window to the Baltic opposite Sweden, the lion of the North; Brandenburg, the old Prussian capital, was placed close to the Slav frontier; and Vienna was at the very gate to Austria.

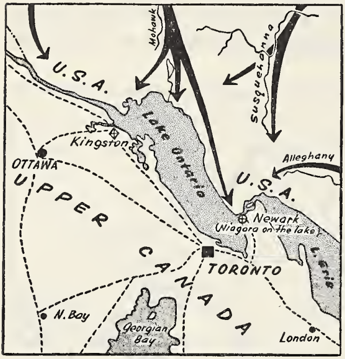

Fig. 17·2. The changing capitals of Upper Canada (Ontario). Note the forward position of the earlier capitals, Newark and Kingston, facing the principal threats from the United States, and the central position of the last capital, Toronto, at the chief crossroads linking south-western, central, eastern, and northern Ontario. The map is oriented towards the United States to show what Canadians in Ontario must have sensed when they were threatened with invasion, and why they must have considered Toronto less vulnerable than other sites.

The capitals of the early colonies of North America, in the same way, were often close to, or even on, the threatened frontier: both Annapolis Royal and Halifax were located astride sea and land routes into the heart of the Maritimes; Quebec leaned forward on its rock to protect the sea or block any thrust from across the Appalachians; and in Ontario both the earlier capitals, at Kingston and Newark (or Niagara-on-the-lake) were right on the frontier. (See Fig. 17·2.)

However, as Cornish also points out, the position of a capital is only confirmed and perpetuated, in the usual course of events, if it lies at a crossways of routes, in a storehouse of resources. Otherwise, its routine services as an administrative centre are impaired. It must be able to reach out to all parts of the country, and it should be at, or near, the centre of the most highly populated part of the land. Possibly for this reason, both Kingston and Niagara-on-the-Lake were superseded by Toronto as the capital of Upper Canada. Toronto was central both to south-western and to eastern Ontario; it had very good access to Georgian Bay and North Bay and so to northern Ontario, and it lay in a rich agricultural region. (See Fig. 17·2.)

When it came to the choice of a capital for Canada as a whole, then the chief considerations seem to have been to secure a central crossways

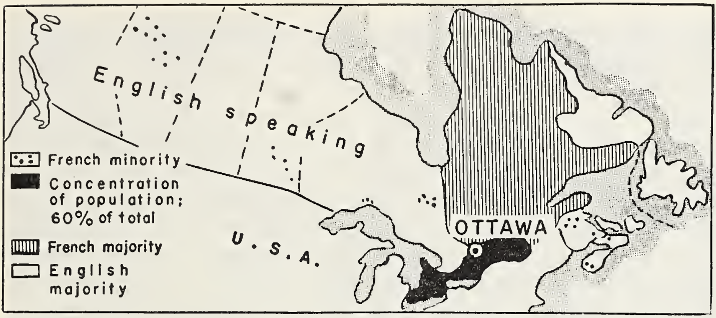

Fig. 17·3. Ottawa, the capital of Canada, is placed in east central Canada, that part of the country first to develop; in the heart of the chief concentration of population; between the French-speaking and English-speaking communities. Although it is not the geographical centre of the country, it appeals to central factors of historical, economic, and cultural geography.

between Upper and Lower Canada, in a plain that could be developed as a reasonable storehouse and that would be fairly near to the chief frontier of the country, (that next to the United States). Bytown in the Ottawa Valley was chosen, renamed Ottawa, and made the capital. Its purpose as a national capital led it to exploit the general setting, a crossways between west and east; and within that to use the particular site, the focus of the Ottawa Valley, as a storehouse of resources. (See Fig. 17·3.)

Washington forms a very close parallel to our own capital. Like Ottawa, it is practically on the border of the two historic ways of life and cultures of the land, namely, the North and the South. At the same time it is on the fertile Atlantic plain, at a readily accessible crossways, and near to America's chief frontier, the Atlantic. (See Fig. 17·4.)

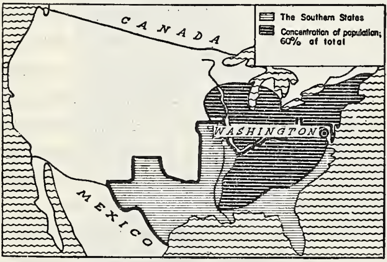

Fig. 17·4. Washington, the capital of the United States, is placed on the eastern seaboard, that part of the country first to develop; opposite Europe, with which the U.S.A. has its closest economic and political associations; in the heart of the populous area; and near the border between the North and the South. It thus satisfies historical and cultural geography, although it is by no means central to the country as a whole.

Cultural purposes also give rise to settlements. Thus in Europe and Asia, there are many famous **religious shrines** which have become centres of religious pilgrimage and church administration. The oldest of them were connected with sacred groves or springs during the times when these aspects of nature were given special reverence. Thus Eleusis near to Athens, in Greece, was a well known shrine where the Eleusinian mysteries were performed. The little city of Eleusis still marks this favoured spot, where by the Maiden's Well, Demeter the Corn Goddess mourned the loss of Persephone, child of spring, to Pluto the grim lord of the Dead. As Fraser describes it, "In her wrath at her bereavement the goddess suffered not the seed to grow in the earth but kept it hidden under the ground and she vowed that never would she let the corn sprout till her lost daughter should be restored to her. Vainly the oxen dragged the ploughs to and fro in the fields; vainly the sower dropped the seed in the brown furrows; nothing came up from the parched and crumbling soil." At length, Zeus, King of the Gods, saw that the people would perish. He commanded Pluto to give up Persephone; "and in her joy at recovering the lost one Demeter made the corn to sprout from the clods of the ploughed fields and all the broad earth to be heavy with leaves and blossoms." In this way, the mystery behind the death and rebirth of vegetation, linked up to that of the human soul, was worshipped over much of the ancient world.

The great, historic religions have been founded by individuals and developed by their disciples. Consequently the places where such individuals were born, were baptized, had their visions, or died, came to be honoured as holy places and grew into cities of pilgrimage.

Jerusalem, site of the Jewish temple, the death of Christ, and a place where Mohammed later stayed, has become the world's greatest shrine, three religions looking to it with reverence and love. Mecca, the chief centre of Mohammedanism, is another famous shrine.

In early days, the Church tended to be associated with the State, and this was especially true after Christianity became the state religion of the Roman Empire. Then Rome became the principal See. (See Fig. 14·7.) Later, when the East Roman Empire developed, after the fall of the West, Constantinople was the headquarters of the Eastern or Greek Orthodox Church. Moscow, "the third Rome", became the centre for the Russian Orthodox Church, when it split from Constantinople.

In the younger countries, perhaps because most settlers still look back to the old shrines as the centres of their faith—Canadian Roman Catholics, to Rome; Canadian Jews, to Jerusalem; Canadian Anglicans, to Canterbury; Canadian Presbyterians, to Edinburgh or Geneva, and so forth—religion has not usually given rise to any cities.

However, local shrines have sprung up in Mexico and in French Canada to honour the life-place of saints or sites of blessing. Ste-Anne

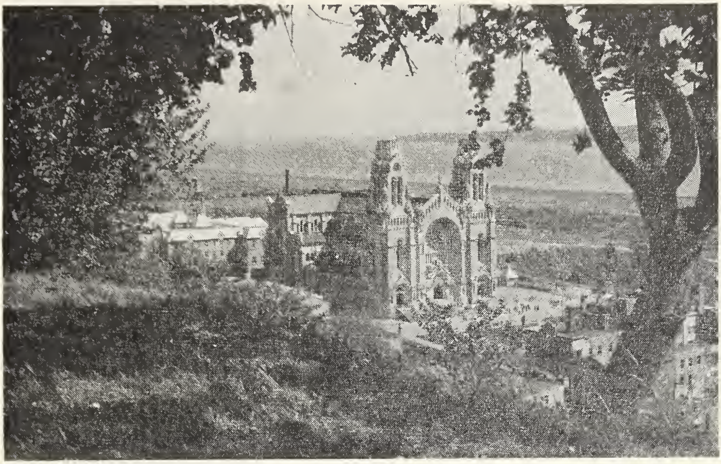

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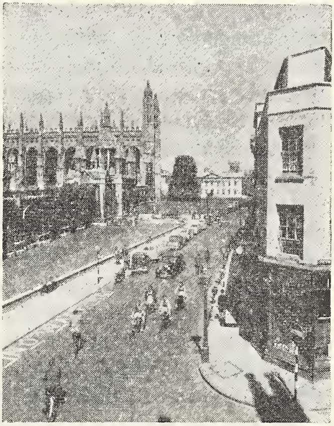
Fig. 17·5. Ste Anne de Beaupré, a shrine-dominated settlement.

de Beaupré in Quebec is one of these. (See Fig. 17·5.) Occasionally, new faiths have arisen in the new lands: Mormonism developed in Salt Lake City and the great temple there is its world centre.

Universities are sometimes the reason for the rise of towns or cities, or have lent fame to older centres. Most European, North African, and west Asian universities started as religious foundations by the Christian or Mohammedan churches. Some of these grew up at the religious sites already set up, such as at Rome, Constantinople, and Jerusalem. Some evolved at separate places, often so as to be withdrawn from the distractions of larger cities. Thus in Britain, the earliest universities were at Oxford and Cambridge, (See Fig. 17·6.) not London,



British Information Service

Fig. 17·6. Cambridge, England, a college city par excellence. Few other settlements are so dominated by university and associated institutions. Here students on their bicycles are passing King's College along King's Parade.

and at St. Andrews, not Edinburgh. Indeed, Edinburgh University, founded in the sixteenth century, was the last of the Scottish universities to be established. London University did not emerge till the early nineteenth century.

In Canada, there are no university towns quite like Cambridge or St. Andrews, where the university is the main reason for the existence of the settlements concerned. There are, however, several places where the university has become the outstanding fact about the community. Thus we could not think of Wolfville, Nova Scotia, apart from Acadia University; or Sackville, New Brunswick, without Mount Allison University; or Lennoxville, Quebec, without Bishop's University. These are essentially "cultural" settlements. Many more such settlements are to be found in the United States, especially in the New England states. Again, most of these, like the older Canadian universities, grew up round religious foundations.

In modern times, university education has become secularized. Universities have grown from theological and arts centres to become great institutions of science and technology. There has thus been a tendency to establish state, provincial, or municipal universities, to serve the pressing problems of industry, trade, technology, and administration. The western universities in Canada are essentially provincial ones and have been set up at Winnipeg, Saskatoon, Edmonton, and Vancouver. In the United States, there are large municipal universities like those of New York, Boston, and Pittsburgh. The United States also has large degree-granting technological institutes, such as the Massachusetts' Institute of Technology, Boston, and the Carnegie Institute, at Pittsburgh.

Recreational purposes have developed a variety of settlements. The need for recreation has grown in our highly industrialized and urbanized life where the pace of living produces considerable fatigue. As productivity per capita has increased, individuals have been able to produce as much in five days as they used to be able to produce in six or seven days. Therefore, millions of people are enjoying leisure time which they never knew before. They have a chance to recuperate from the strain of living in long evenings and week-ends and in special vacation leave.

Mention has also been made of how "interest" associations have grown in the modern urban community. Stressing such associations in place of kin or neighbourhood ones has of course whetted the desire to develop hobbies and recreations and cultural pursuits. People wish to enjoy a fuller life than ever; they have more individual choice than ever; they have more time and a greater mobility than ever: these things all add up to the need for recreational centres.

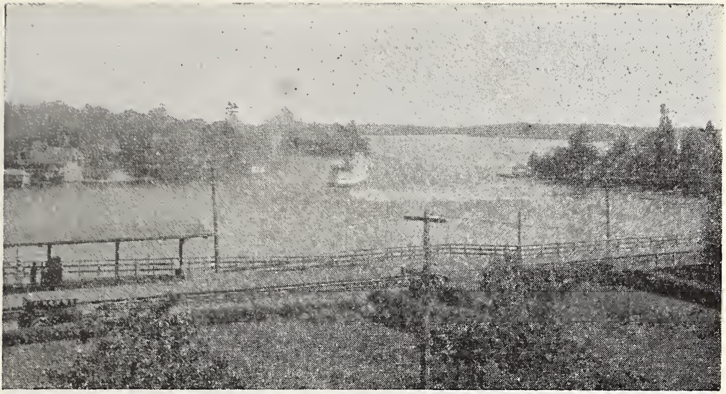


Fig. 17·7. Air view of typical Muskoka Lake holiday resort, with individual cottages set among woods by the lake. Lake boats carrying tourists, visit outstanding hotels.

Most of the great cities on the Atlantic and Pacific and on the Great Lakes have their beach "colonies". These are satellite communities consisting of rows and rows of private cottages, hotels or lodges, and restaurants and hot-dog stands.

In addition, there are usually cottage colonies on interior lakes and rivers in the woods. These are perhaps typical chiefly of North America. Americans and Canadians have a deep love of the "wilderness", possibly because they are still so near to the pioneer days when they had to hack their homes out of the forest wilderness and no doubt, too, because there is still so much wild, untamed country in their midst. Their countryside is nowhere so neat and tidy as that of Britain or France but breaks out on every side in rough meadow, ragged woodlot and the deep, sombre, untrimmed and sprawling forest.

In any case, millions of city dwellers leave the cities in the summer and take a cottage in the woods by lake or stream where they can live in a more natural, relaxed sort of way. They tend to converge for these purposes on lake districts at the edge of the Canadian Shield, like Muskoka (See Fig. 17·7.), Haliburton, and Kawartha, or Gatineau, Mount Tremblant, and the Laurentides; or in lake-filled glacial valleys in the Canadian Appalachians and Cordilleras.

Because of the heavy snow fall and lengthy winter of northern latitudes, skiing is one of Canada's outstanding sports, and many ski resorts have developed, like Revelstoke, Banff, Jasper, in the west, and the towns of the Gatineau and Mount Tremblant hills in the east. (See Fig.

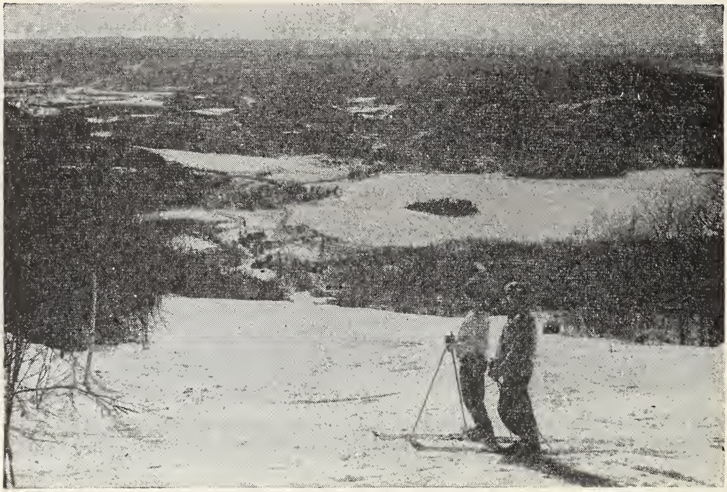


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Fig. 17·8. Skiing at Mt. Tremblant, Quebec. Many villages in the Laurentian Mountains earn their principal livelihood catering to winter skiers.

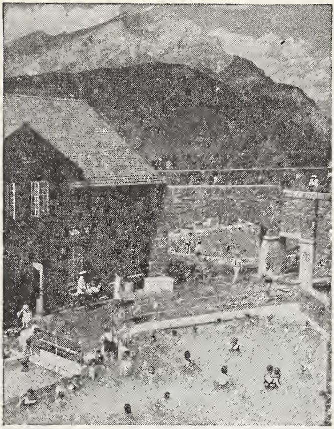
17·8.) Other specialized resorts are devoted to fishing, as for example along the Restigouche in New Brunswick, to horse racing, to yachting, and other sports. St. Catharines is known as the Canadian Henley. Peterborough and Stratford, Ontario put on summer drama festivals.

In Europe, such special centres are famous. Edinburgh and Salzburg are noted throughout the world for their music festivals; Oberammergau, for its religious dramas; Stratford, for its Shakespeare festival; Cowes, for its yachting; Henley, for its boat races; Epsom, Newmarket, and Auteuil, for horse racing; Chamonix, Interlaken, and Grindelwald, for skiing; and Monte Carlo, for games of chance.

Health resorts have a highly specialized function and must choose a few well favoured sites. In Europe, sulphur and other mineral springs have long been patronized. Bathing in these springs daily and drinking their waters are thought to be good for a number of ailments. Since, for generations, it was only the rich who could afford to patronize such resorts, they also became holiday places for high society in general, where games were played, and music and drama performed. In Britain, the beautiful town of Bath was patronized by wealthy Roman governors, traders, and soldiers; revived in the seventeenth century it has been a social and health resort ever since. Vichy is a similar place in France, where, for many generations, fashionable people went to "take the waters". Vichy mineral waters are widely used in western Europe today. In Canada, the hot springs at Banff are a part of the attraction of that place. (See Fig. 17·9.)

Sanatoria for the treatment of tuberculosis were originally set up in mountains, especially in the French and Swiss Alps, where the rare atmosphere and clear, sunny skies helped in the cure. With different treatment, the value of such sites has not been so exclusive, and sanatoria are now set up nearer the main centres of population.

Many arthritic sufferers are advised to go to dry and sunny climates and for that reason settle in resorts around the Mediterranean and in North Africa. In North America, people afflicted usually go to resorts in Arizona or Nevada.



Canadian Government Travel Bureau

Fig. 17·9. The hot springs at Banff, Alberta. Although these are not the principal reason for the existence of this famous health and tourist centre, they form an added attraction and are much patronized.

Special economic purposes have developed numerous single-activity settlements in Canada and elsewhere. Thus mining has given rise to many exclusively **mining centres**. This is particularly the case on the Canadian Shield wherever the land is too rugged for agriculture and the climate too severe for commercial forests. There mining may be the only activity, as it is at Port Radium, Yellowknife, Uranium City, Beaverlodge, Lynn Lake, and Flin Flon. (See Fig. 17·10, page 292.) Farther south, mining areas are often close to glacial-lake clays that can support agriculture or forestry, and mining centres become market towns for farming and lumbering communities. Such is the case with Sudbury, Haileybury, Kirkland Lake, Rouyn, Noranda, Malartic, and Val d'Or.

Here and there a site is chosen central to a whole number of mines or mining regions where a common smelter can be built to serve several areas. The most famous smelter town of this kind is Trail, near the coal and metal mining communities of the Rockies and of the Selkirks. However, smelting may be quite far removed from the mines and be set up near the market for the products concerned or near points where coal can easily be assembled or cheap electric power is available. Thus the smelter for the uranium deposits of the Canadian North-west is at Port Hope, where coal and chemicals can easily be brought together, and

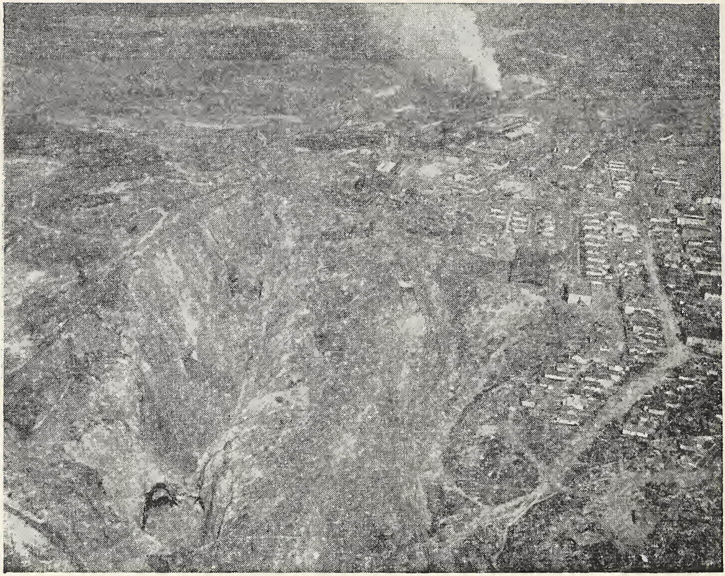


Fig. 17·10. Flin Flon, on the Manitoba-Saskatchewan border, is a busy mining town in a rough countryside unsuited to other occupations.

from which the finished article can be sent to Canadian and American atomic piles, not far away. Similarly, the smelting of nickel takes place at Port Colborne, where again coal and chemicals may be assembled cheaply and where there is cheap power from nearby Niagara Falls.

Lumber and products derived therefrom are of immense importance in Canada's economic structure. Lumber towns are more scattered than mining towns since forests spread wide and far as compared with the limited distribution of ore bodies. At one time, the tendency was to have many small, widely distributed lumber camps. These swiftly became "ghost" towns once the tree growth was depleted, and then the workers and their families were forced to migrate to new areas of supply. This had deleterious social effects and was not really the most economic way of developing lumber resources.

The social problems of these small lumber towns are important to understand. They are typical of the forest frontier. In the first place, when a mill is started, there is a problem in collecting enough labour. Usually there are no farms around with surplus labour since the forest areas are beyond or between the farm areas. Labour has to be brought in. Much of it may be drawn from the country's immigration and often consists of a very heterogeneous group with few common traditions and little social cohesion. The settlement may be entirely male and consist of young lumberjacks, machinists, truckers, and foremen. It is not surprising, therefore, that problems of behaviour arise.

However, if the settlement flourishes, some of the men marry and want to bring their wives in. Women begin to appear; married quarters are set up. The modifying and ameliorating effects of this gradually become evident. Single women are attracted to the settlement in pursuit of various occupations such as cooking, waiting in small restaurants, laundering, and nursing. Yet the women are much in the minority. The population is not in proper balance. Many psychologists regard an unequally balanced population as essentially unsteady and immature. It tends to bring out over-assertive traits in men and to make women over-submissive. When children appear, a more normal social life begins, and churches and schools can thrive. The mill-town starts to function like any other town. All kinds of clubs and societies are formed to meet the recreational and other social needs of men and women both young and old.

Nevertheless, the supply of timber may run down. This was usually the case in early days when proper forest conservation methods were not known. It may still happen where they are not observed. The men gradually leave town to work in camps farther and farther upstream. The population becomes unbalanced again. This time there are too many women and children. The clubs, societies, and churches languish or become women's associations. Children grow up without the regular supervision of their fathers. Home discipline may become impaired with an increase in juvenile delinquency.

Then the boys grow up and leave for camp. There are few jobs for the girls, and they drift into the cities, far away. Families that want to keep together move out of the neighbourhood. Stores close for lack of business. Churches close for lack of members. The business and professional elements in the population are much reduced. The mill owners finally decide to abandon the works for a new site. The town becomes deserted. Second growth scrub returns; seedlings grow between discarded boilers or burst through verandahs and floors and eventually cover up the site and let in the wilderness.

To get around these problems, the main economic and social activities of the forest frontier have tended to concentrate in a few principal locations, dominating whole river basins or stretches of forested coast. If this can be done where there is plenty of cheap hydro-electric power, additional industries, other than sawing or pulp or paper making, can be established—such as chemical or textile plants. These broaden the whole scope of the town, as they have done at Three Rivers and Hull, and thus enable it to flourish on a permanent basis with a complete range of occupations, ages, social groups, and interests.

Transportation towns, though limited in scope, play an important part in the Canadian economy. Most major transportation centres have, of course, become great commercial or industrial ones. But some continue with transportation as their *main* function. Both the Canadian Pacific Railway and the Canadian National Railway, for example, keep "railway" towns going. These are not necessarily at the great junctions, though they usually lie near them or between them. Rather, they are separate nodes where trains are sorted or engines and coaches are repaired. Thus to mention but a few cases, in the Maritimes, Moncton is principally a railway town; in Quebec, Charny; in Ontario, Stratford; in the Prairies, Moose Jaw; in British Columbia, Revelstoke. These points have large round-houses or tooling sheds, machine shops, and coaling yards. In England, Swindon and Crewe play similar roles.

Inland shipping has long been important in Canadian transportation. Again, many of the shipping points have developed into major commercial or industrial cities. But some of them are basically transportation centres, whose chief function is to unload goods from trains and transfer them to lake boats, like Fort William and Port Arthur, or unload them from lake boats to put them on "canalers", as at Port Colborne before the Welland Ship Canal was built, or as at Prescott to this day. (See Fig. 17·11.)

In the modern world, and particularly in the American hemisphere, the chief urban communities are the **commercial and industrial cities.** Usually these are dual-purpose sites that both trade and manufacture goods. However, some are more commercial; others, more industrial.

Compare Toronto with Hamilton, for example. They are both important marketing and manufacturing cities. But in Toronto, industry employs only about a quarter of the gainfully occupied population; in Hamilton, over one third. Thus Toronto depends more on finance and commerce; Hamilton, more on industry for a main livelihood. Toronto employs 1 salaried person for every 5 wage earners; in Hamilton, the figures are 1 in 8. Toronto has many more business and professional men and government officials drawing salaries, in proportion to industrial workers, than has Hamilton. The "Mountain City" is actually one of the most industrialized of Canadian communities, with a very high proportion of factory wage earners.

Commercial cities are chiefly trading and financial hubs for the exchange of goods and the financing of all kinds of economic enterprises

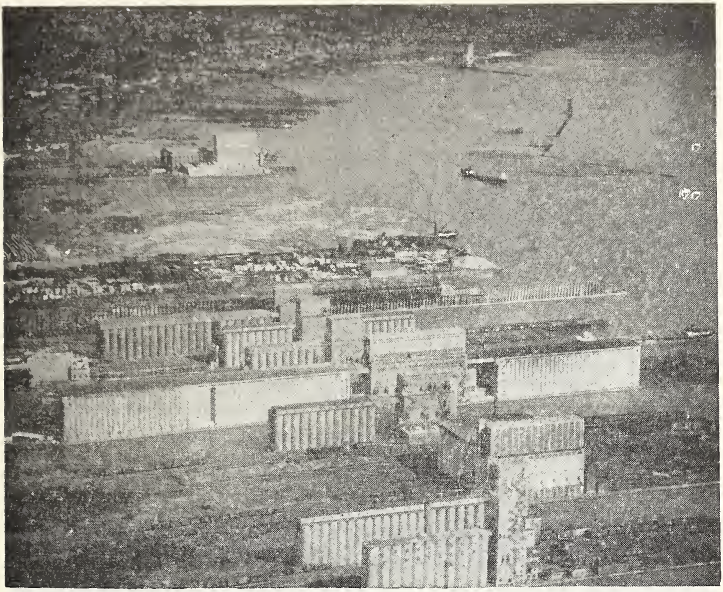


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Fig. 17·11. Air oblique of Ft. William-Pt. Arthur, emphasizing railway and shipping terminals. Railways bring grain from the Prairies and boats transport it to eastern Canada by the Great Lakes system.

throughout the regions which they dominate. They are inclined to develop where different economic areas come together in a natural focus, at which there is an obvious opportunity and facility for exchange. Thus Toronto, one of Canada's principal commercial centres, arose at a point central to south-west Ontario, central Ontario, and eastern Ontario. At the same time, Toronto is on the direct route north and so is able to serve Northern as well as Southern Ontario. Finally, its position enables it to trade readily with American interests, either directly across the lake, or by railways going to the mid-west or the mid-Atlantic States. Thus it has an opportunity as a wholesale, retail, banking, mortgage, and insurance centre which certainly surpasses that of any other Ontario point. (See Fig. 17·12, page 296.)

Montreal, the other principal commercial city of Canada, is set in the midst of the Quebec lowland with the Shield to the north and the Appalachians to the south. The St. Lawrence estuary gives it access to the Maritimes; the St. Lawrence River, to Ontario; the Ottawa, to the

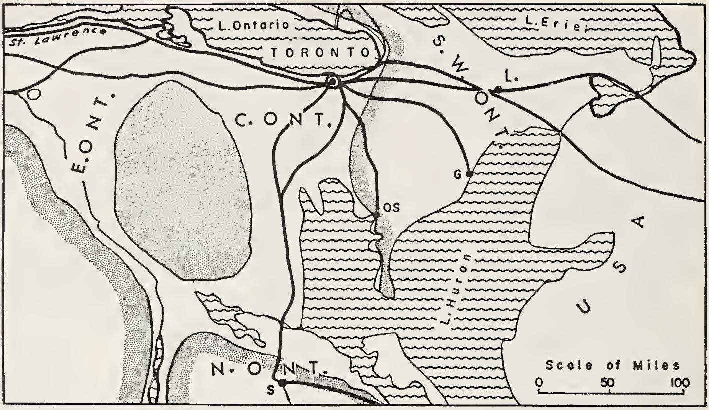

Fig. 17·12. Diagrammatic sketch of the general setting of Toronto, as seen from the north, shows it to be the one centre favoured by geography to keep the several parts of Ontario in contact. It draws down the mining interests of northern Ontario to the commercial ones of central Ontario; it attracts the products of specialized farming in south-western Ontario and the lumber and other interests of the Ottawa Valley in eastern Ontario. Therefore the economy of Toronto is extremely varied and well-balanced, the epitome of that of the province. This centrality is most obvious from the perspective of northern Ontario. Although the greater part of Ontario is to the north and west, it is closer to Toronto than to Ottawa (O) or London (L).

Canadian West; and the Richelieu-Hudson, to the American East. A better natural trading site could hardly be imagined. It is no wonder that St. James Street, Montreal, is to Canada what Wall Street, New York, is to the United States—the heart of the nation's finances.

In addition to these major centres, at the meeting place of different economies, there are local commercial points that serve as the business focus for a single region. Thus London is the commercial centre of south-west Ontario, and Ottawa, of eastern Ontario. Quebec City is the chief commercial point for eastern Quebec, and Sherbrooke, for the Eastern Townships. At these places, the products of the local region are marshalled and transferred to long-distance vehicles for transportation to the commercial capitals of the country, to remoter regions, and abroad. Similarly, manufactured goods from other regions are here unloaded and redistributed to the local region.

Industrial cities may share the same general setting as commercial ones because they, too, are dependent on assembling goods from their own or other regions and distributing their finished products far and wide, but they may select special sites, more suited to manufacturing itself or to the particular product they make.

As has been indicated, the choice of local site may depend on: the availability of cheap fuel (Southern Ontario, the Montreal plain, Northern Nova Scotia, Vancouver, Calgary, and Edmonton) or on the presence of large amounts of hydro electricity (the cities of the Niagara Peninsula, of the St. Maurice or Saguenay valleys); on access to raw materials (Southern Ontario, to American supplies via Great Lakes; Montreal, to Atlantic imports; Vancouver, to Pacific imports); on contact with markets (Southern Ontario and Western Quebec, with the markets both of western and eastern Canada and of the United States); on a good labour supply from a densely populated plain (the Central Provinces); on a good water supply (the Great Lakes-St. Lawrence waterway); and on adaptable local conditions.

Specialization soon begins and tends to make use of one or more of these advantages. Thus Sarnia, on the oil route from the Upper Lakes, has developed refining and the making of petroleum by-products. (See Fig. 17·13.) Niagara Falls, noted for electro-chemical plants, and Welland, for electro-metallic industries, avail themselves of cheap

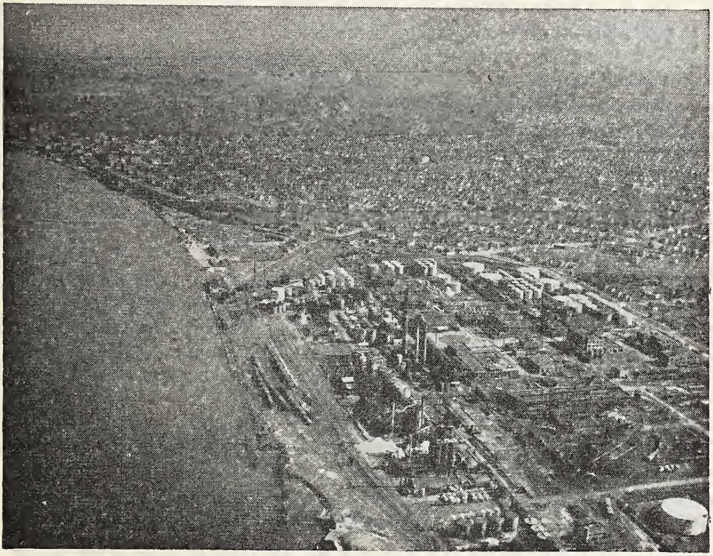

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Fig. 17·13. Air view of Sarnia and vicinity, showing oil refineries and chemical industries. The salt beds underlying the vicinity are an important local source of material for chemical plants.

power at Niagara Falls. Three Rivers, gateway to the forest and power of the St. Maurice, is known for pulp and paper mills. Arvida, at a source of cheap electric power and near Port Alfred, import centre for bauxite and cryolite, has concentrated on smelting and refining aluminum. Other examples have already been given for the rest of the Central Provinces and other industrialized parts of Canada.

It is apparent that the economic or social purpose for which a settlement is developed may decide its location just as much as its physical setting and site. The human and the physical environment constantly react upon each other in the geography of settlement. That is why the study of settlements embraces and draws together all the elements of geography—why it is, in fact, the epitome of geography.

QUESTIONS

A

1. What are the main purposes for which towns are built?
2. How do these purposes affect the choice of urban situation and site?
3. In Fig. 17·1 a number of places are shown which have been or are important for the defence of Canada. Identify them. What geographical reasons might be assumed to lie behind their choice?
4. In Fig. 17·2 the positions of Niagara-on-the-Lake (Newark), Kingston, and Toronto are shown with respect to American approaches and Canadian defences. Why was Toronto finally selected as the capital of Upper Canada (Ontario)?

B

5. Compare and contrast the situation of Ottawa with that of Washington as capital cities. (See Figs. 17·3, 17·4.)
6. Which settlements in Canada are dominated by the following functions (pair each function with a name): defence, administration, religion, college education, health, recreation?
7. Which settlements match the following functions: fur trading centre, fish curing, sawmilling, pulp and paper making, metal mining, coal mining?
8. Draw diagrammatic sketches showing the importance of the following towns as transportation centres: Kamloops ,Calgary, Winnipeg, London, Moncton.
9. What geographical factors led to Toronto's predominance as Ontario's leading commercial city? (See Fig. 17·12.)

C

10. What might be considered the most important functions in the location of the majority of Canadian cities?

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CHAPTER XVIII

Urban Geography

FUNCTION AND FORM

It was once the fashion to despise the city as a formless chaotic lump. Cowley wrote:

> And they (methinks) deserve my pity
> Who for it can endure the stings,
> The crowd, and buz, and murmurings
> Of this great hive, the city.

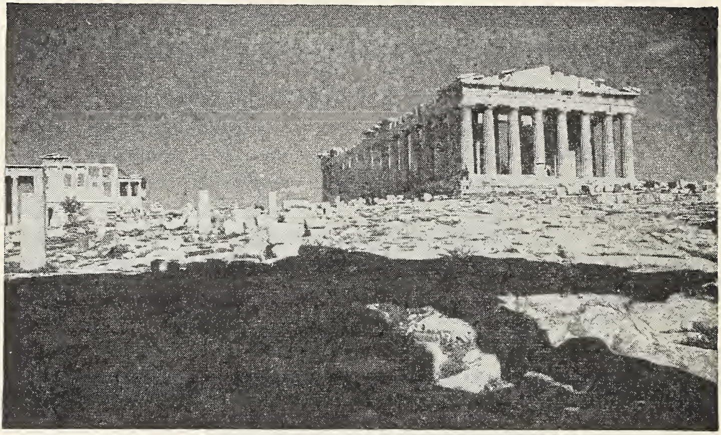
Yet, like a beehive, the city has its own organization and order. It has its definite form, and this is related, in a specific way, to its function. Each city has its own pattern, caused by the way in which individuals react upon each other and by the demands of different occupations and interests. Though, amidst a buzz of activity, a crowd of institutions compete with each other, there is an overall "hanging together" and mutual dependence on each other, so that everything finds its appropriate place: as with bees. And, as in a hive, results are produced. Cities help to sweeten the whole human lot, providing machines to save us fatigue, goods to supply our needs, plans to conserve our time and energy, and arts to beautify and enrich our homes and lives.

Fleure maintains "the city is a product of social expression through a long period." The physical form reflects the social order.

CITY TYPES OF EUROPE

A brief survey of European and North American cities will show how their general functions affect their internal form. The idea of the city began in west Asia and the Mediterranean; thence it spread to western Europe; after that, to central and northern Europe; and so to eastern Europe. At the same time, the city idea had spread through India and China.

The Mediterranean city had three main functions: religion, defence, and commerce; these found expression in the temple, the fort, and the



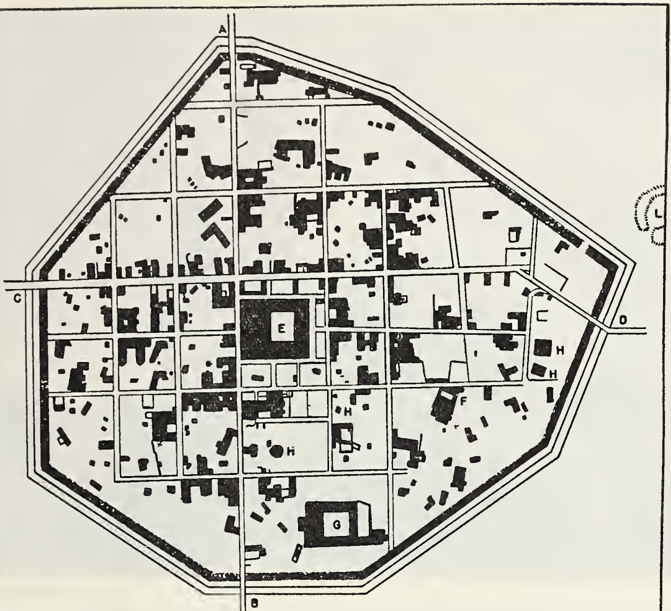
Ewing Galloway

Fig. 18·1. The Acropolis at Athens, a city crowned by its temple. Many of the ancient settlements of the Mediterranean and Near East grew up when religion dominated even temporal affairs, and so the temple had a commanding place. The market square was very often opposite it or below it, if it was on a hill, as in Athens.

market place. The temple and fort often shared a hill site; the market place was below in the valley or by the shore. (See Fig. 18·1.) As population grew and various recreational, cultural, and administrative functions developed, the typical city added an arena, an open-air theatre, and public baths. The Roman cities also had a Senate house, from which the city and its province were governed, and a Forum—a wide, open, central space with a speaker's platform where public meetings could be held and where popular government made itself heard.

The Romans carried the idea of the city into France, Britain, and Spain where, before that, there had mainly been hamlets and villages. The first requirement of the Romans was defence, and their earliest settlements were military camps. After the Romans left, these camp sites continued to be developed, leaving a strong military stamp on the settlement concerned. It became square in form, and was surrounded by a wall with four gates, one at each quarter. It led back to a central square, the old Forum. Sometimes this would have a temple facing it. A large arena would be at one side of the city. Silchester, in England, is a good example. (See Fig. 18·2.)

After the decline of Rome, civilization was preserved in western Europe by the Church. Therefore many church-centred settlements arose, like Paris, Rouen, Tours, and Chartres. (See Fig. 18·3, page 302.) The church

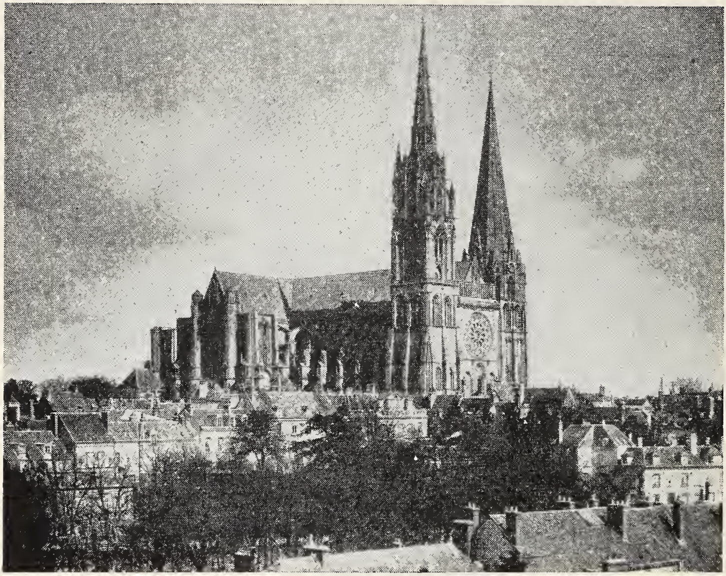


Plan of Calleva Atrebatum (Silchester), after the Society of Antiquaries.

A, B, C, D The Gates
E...........The Forum (with Church to S.E.)
F...........Baths
G...........The Hostelry
H...........Temple
L...........The Amphitheatre

Fig. 18·2. Silchester as it once was—a Roman camp which developed into a pleasant city.

was usually located opposite the central square, and the town grew up around it. Several main streets would come in from the countryside, generally from all points of the compass, and thus give the town a star-like shape. Branch streets, off the main ones, were often devoted to individual crafts or trades. Thus in the cities of France there would be the Rue des



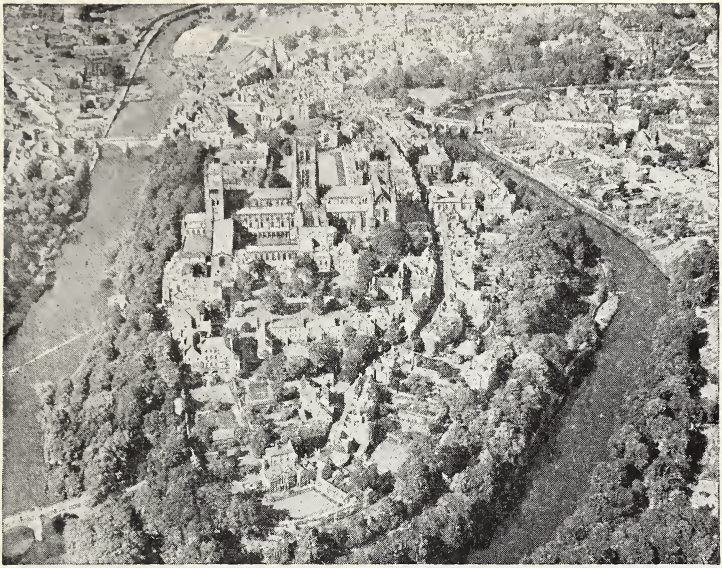
Ewing Galloway

Fig. 18·3. Chartres, cathedral and town. In Medieval Europe religion again had great temporal power, and many settlements grew up about a cathedral or abbey.

Orfèvres, with jewellers' shops; the Rue aux Juifs, where the moneylenders and bankers lived; the Charronnerie, where carts were made and mended; the Rue des Chaudronniers, where hardware was sold; the Rue des Tisserands, in which the weavers lived and worked. On the outskirts of the town were the fair grounds, where people came in from the country and sold and bought goods and where there were eating and gaming booths, cockpits, and the like. Often the nave of the main church or cathedral in the centre of the town was used by the merchants and city fathers in place of a town hall. As a rule, the town hall was a later innovation. Often it was not at the main square, but a lesser opening in the town.

As times were very unsettled in the Middle Ages, a number of cities had both a castle and a cathedral, often built close together at the heart of the city. Avignon in France, Durham in England, Prague in Bohemia are cases in point. (See Fig. 18·4.)

In north Germany and round the Baltic lands, cities grew up for trading purposes or were established by orders of knights devoted to



Aero Pictorial Ltd.

Fig. 18·4. An aerial view of Durham, England, showing how the town grew around the castle and the church, both built at a commanding position on a spur all but surrounded by water.

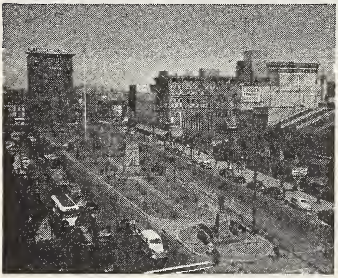
Christianizing the population. Their typical form, as at Lubeck, was that of a castle at one end, a central square with a town hall facing it, and a church at the other end. German cities, in general, stressed the town hall over castle or cathedral as the burgomasters obtained power and became the ruling group in city affairs. The Rathaus was usually the principal building, and commercial interests dominated the city form, as in Frankfurt-am-Main.

In eastern central Europe, Slavic settlements were transformed into cities by Scandinavian traders, German knights, or Roman Catholic missionaries. They usually had a cathedral and castle on one side of the river or up on the hill and a large market place on the opposite side of the river, as at Cracow. Very often the city split up into several quite distinct settlements, some with a separate wall around them, and was not so unified as its western counterpart. Thus there would be a Slavic quarter; a German district; a Jewish area—the ghetto; a Roman Catholic suburb; a Greek Orthodox suburb; and, in south-eastern Europe, a Mohammedan quarter.

THE MODERN COMMERCIAL-INDUSTRIAL CITY

European styles have affected North American patterns. Cities dominated by a fortress, like Halifax and Quebec, were especially significant in early colonial times. Montreal followed the style of old France and had its central square with the cathedral facing it. The market place, still in existence, is closer to the river; the homes were all clustered around the cathedral square. Ste-Anne de Beaupré, as already mentioned, nestles under its great church—as indeed do many other French-Canadian towns, where the ecclesiastical traditions of the Old World have rooted themselves firmly and deeply into the soil of the New. Here the church, monastery or nunnery, the church school, the church hall, the hall of the Knights of Columbus are the central institutions of the settlement, often pushing the stores and banks out to the side.

Nevertheless, in most North American cities, the commercial and industrial functions predominate and have the chief influence on the form of the city. Through the various pressures or tensions which they create, they literally push and pull the city into shape.



National Film Board

Fig. 18·5. Air view of The Gore, Hamilton, Ontario—the heart of the city.

The core of the commercial-industrial city is occupied by the big retail stores, the chief banks, insurance, loan and legal offices, the principal theatres, restaurants, and leading hotels, together with administrative offices, metropolitan churches, and terminals. (See Fig. 18·5.) All roads and main streetcar and bus lines lead to and run out of this nucleus. There may be a square at the centre, where the routes meet, although this is by no means always present. The institutions which gather here are those that have an importance for the whole city, and therefore, for the entire region served by the city. They tend to centralize, co-ordinate, and control the business activity and the chief cultural and recreational interests of the whole community. In the heart of the modern city, there is such a high concentration of business interests that residential areas are forced out into urban districts.

Within this *central business district* the different kinds of buildings tend to segregate according to the type of traffic they wish to, or may afford to, exploit. (See Fig. 18·6.) Retail stores usually jostle each other closely at the junction of the streetcar or trolley routes that bring the shoppers in from the suburbs. It is not quite so necessary for the theatres to be at the main intersections since their traffic is of a special kind and lasts for only a short period; they do not have to attract the drifting stream of window-shoppers all through the long hours of the shopping day. Nevertheless, they are close to the centre to be available to people from all parts of the city. They often group themselves near the hotels in order to attract the overnight visitor who wishes to relax for a few hours in a show.

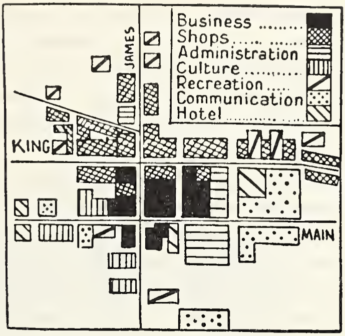


Fig. 18·6. Segregation at the nucleus of the core of a city takes place as competition occurs for the main crossways. In Hamilton the chief internal crossways of the city is at King and James where shops predominate. The chief regional crossways of the city, at Main and James, is dominated by banks and brokers' offices. Cultural and social institutions tend to group themselves on the southern margins, near Class A residential districts; the chief recreational institutions are located on the northern margins near the bulk of the population. Administrative buildings are as centrally placed as possible, but cannot compete with large offices and multiple stores for the most frequented street corners. Transportation terminals are just on the edge of the core area; they must be near the core, but occupy too much space to be at the very centre.

The main banks are on the roads coming in from the surrounding regions, as well as from the suburbs. They, too, are not quite so dependent on the drifting tide of pedestrians, since they serve a special clientele, that may use them only two or three times a month. Thus they tend to be at the approach to, but not in, the very central area.

On the sides of the downtown business area are the city hall, chief police station, city welfare and social agencies, provincial or federal government buildings, and similar offices. These, too, must be near the centre. But they do not take the volume of traffic required by stores and restaurants and so are not at the very heart of the city. (Contrast this with the European places where the Rathaus or Hotel de Ville is often at the central square.) In North America, they cannot compete for the very high-priced land at the urban centre.

Neither can the churches and other cultural organizations. These too, rarely dominate the heart of the community, but tend to be on its outer edge. However, the metropolitan churches, concert halls, political and cultural clubs, and recreational centres must be fairly central.

Finally, on the outermost edges of the business centre are the transportation terminals: the railway and bus stations. Although they must be near to the city nucleus, in order to deposit and pick up travellers who stay in central hotels and do business in central stores and offices, or to allow the maximum number of city residents the best opportunity of catching a train or bus, the space necessary for their proper functioning usually prohibits their establishment on the high-priced land right at the city "loop".

As the city grows, the pressure of population from its margins increases more and more to the centre. Increasing numbers of people demand increasing access to an increasing number of shops, restaurants, hotels, banks, and theatres. These central institutions do expand **outwards,** to a certain extent, to meet these demands, buying up residences and wholesale offices and yards. But of course by doing so they are not quite so central; they may miss a little of the vital share of traffic pouring into the city centre. Therefore, they expand by **moving up,** by going into taller and taller buildings, by the technique of the skyscraper. So the city core shows the maximum amount of **vertical** expansion and thus continues to serve the ever enlarging city. It does this indeed to the point where traffic becomes so congested at the city centre that no further expansion there is economic, at which point sub-centres usually start to develop near the margins of the city, to offer an alternative focus for shopping and business.

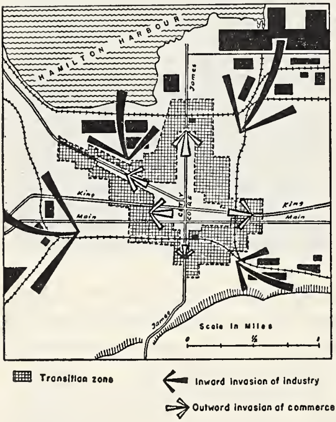


Fig. 18·7. The transition zone of a city, as in Hamilton, usually surrounds the city core, lying between it and the working class residential and industrial areas. Its transitional nature is due to invasion on the inside by business and shopping from the city core, and on the outside by industry and associated activity. Solid areas on the diagram are industries.

A **zone in transition** surrounds the city core. (See Fig. 18·7.) This is a polyglot area, with a great number of functions. Its chief characteristic is that it is always changing. It is the area that feels urban pressure more than others. For, on its inner edge, the business, recreational, and administrative circle is pressing outward, as offices seek new space at the crowded city centre. At its outer edge industries tend to push in, especially as secondary industries grow to serve the business interests or the city population. Thus an area which might best be described as a "shatter belt" exists, shattered by business from within and by industry from without.

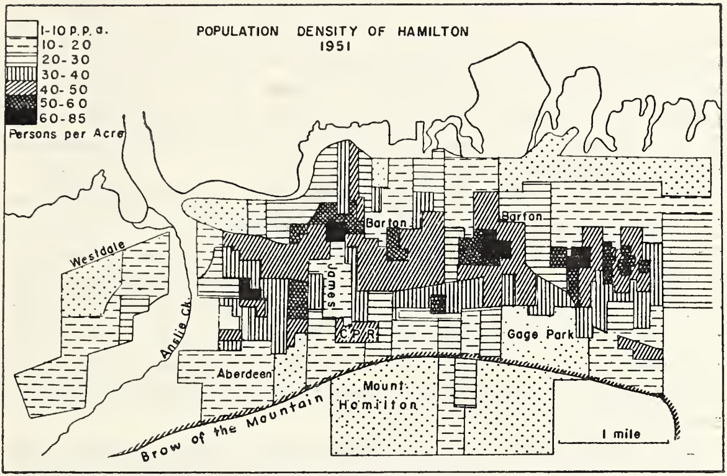


Fig. 18·8. Overcrowding in a city occurs in a zone about the urban centre, between the central business district and the factory belt. In the case of Hamilton there are two main areas of overcrowding, about the main city centre on James St., and about an eastern sub-centre. Note the concentration towards the north side of these business centres, between them and the factories of the bay shore.

The zone in transition is characterized by the less important or else by the newer businesses that do not have a central location right downtown; by wholesale agencies and by warehouse companies supplying the downtown retailers and terminals; by poor housing areas, where former residences are carved up into rooming houses and tenements to permit many people to crowd into a small space; by overcrowding (See Fig. 18·8.); by luxury flats for business couples who wish to live near, but cannot dwell at, the city centre; and by many light industries serving the business area—hat and clothing shops making or altering for the retail stores, office equipment and repair plants, laundries, and bakeries for the hotels and restaurants, window-display firms, theatrical stores and those making religious vestments and candles, printing and multigraphing plants, etc.

This is a zone of the greatest contrasts. It includes the "Gold Coast", the area of swank apartments, expensive town mansions, and residential hotels, and also the "slums", where the poorest people live. Rich bachelors, business couples, and retired couples live here to be near their clubs and businesses. The poor exist here in order to pick up a variety of jobs within walking distance of their tenements—cooking and scrubbing in the hotels, charring and doing repairs in the retail stores and offices, acting as night watchmen and elevator operators, loading and unloading at stores and terminals, ushering in theatres, waiting in cafes, working in laundries and bakeries, in dress alteration places, printing presses, and the many other agencies there may be—all the manual labour and supporting services connected with the various businesses which constitute the "hub" of a city.

The zone attracts the **immigrant** who usually has to shop around for jobs, who cannot afford to spend much on transportation, and who looks for cheap rooms. These are the things he finds in the zone, and often he stays there for years before he is sufficiently adjusted to become attached to one job and able to buy a home of his own. Then he will no doubt move out to one of the truly residential zones. But meantime he dwells in the shatter belt. It is only natural for him to seek others of his kind, who worship in the same religion, speak the same language, dress in the same clothes, and eat the same foods.

Thus **ethnic areas** grow up (See Fig. 18·9.) which are really little towns of their own, with their own churches and halls, places of entertainment, cafes, newspresses, and shops. So we have Harlem in New York, Little Sicily in Chicago, Chinatown in San Francisco. In fact most large cities have their own Chinatowns, Harlems, Little Sicilies, Irish Shantytowns, Jewish Quarters, and the like.

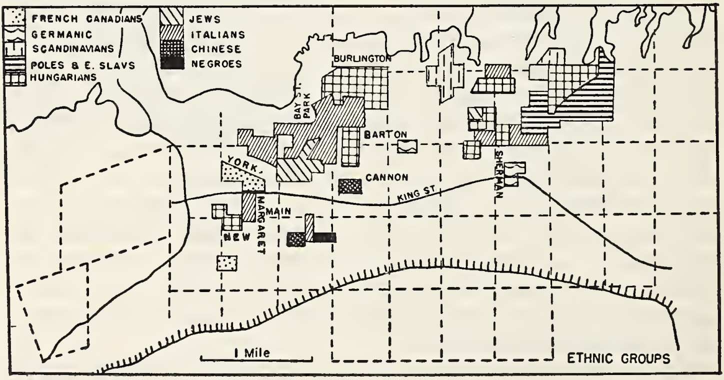
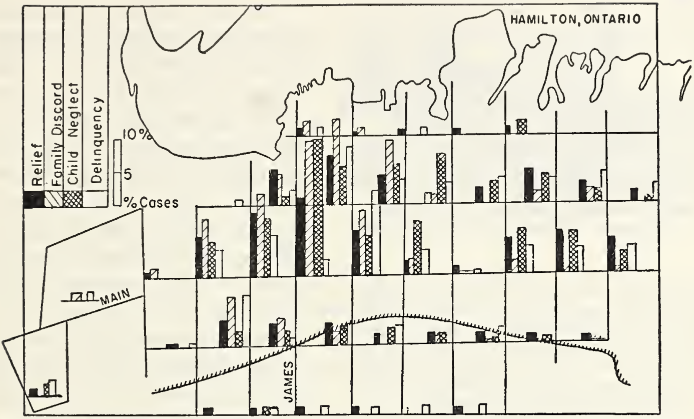


Fig. 18·9. Ethnic groups, other than the predominant one of Canadians of British stock, have come mainly from outside Ontario and tend to live together to form ethnic areas or blocs. Since most of these immigrants in Hamilton came to work in factories, workshops, or stores, they live between the commercial area and the industrial belt. Most of them are found in the transition zone; others live in workingmen's homes in residential interstices of the factory region.



Incidence of Relief, Family Discord, Neglect & Delinquency: cases per unit area shown by height of column.

Fig. 18·10. The concentration of social hazards is greatest in the transition zone and in areas invaded by industry. Note relationship to population pressures (18·7, 18·8) and to ethnic areas (18·9).

The multiplicity of habits and standards in the zone helps to produce a tolerance and a non-conformity, an easiness of manners, and a lack of convention in its people. In any case, the shatter belt is also the "Bohemia" of every large city, where people live and play and work together who do not accept the common standards but follow their own, unconventional way of life. Also in this zone are the **hobohemias** of our modern cities, the quarters frequented by transient labourers and chronic tramps.

The social life of the area is therefore characterized by the greatest social gulfs between economic classes and ethnic groups, by very great diversity of cultures and backgrounds, by the greatest mobility of the population, by the least amount of "neighbouring", by the minimum amount of social responsibility and participation, and by the highest social hazards.

In this last respect, the shatter belt is the crime belt of the modern city, hiding its **underworld**. Here live most of the people arraigned in court for theft or assault, for juvenile delinquency, for desertion of wives, and for the neglect of children. (See Fig. 18·10.) Preying on these conditions are many specialized agencies and institutions. But fighting them are others, and this is also the salvation belt of the city, where the principal missions, the Salvation Army, the social agencies, and the clinics are located.

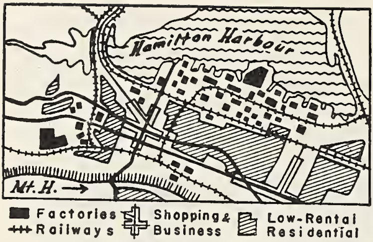


Fig. 18·11. The distribution of stable, low-rental, residential areas shows them to be, as in Hamilton, near the factory belts and the shopping centres of a city. A few, e.g. Mt. Hamilton, may have developed farther away on the outskirts of the city in areas of low taxation, subsequently being incorporated into the city proper.

The low rental residential area is the next zone to develop in the city. (See Fig. 18·11.) In it dwell the mass of those working in the principal factories of the city. The zone is not entirely residential, by any means. Interspersed with living quarters, there are several plants that do not require a great deal of space. There are also many neighbourhood stores and banks, schools and hospitals, parks and rinks, neighbourhood theatres and hotels, probably an arena, and possibly a race track.

The social life of the area is characterized by stable work, by well developed family life, by the integration of more experienced immigrants and the prevalence of second-generation immigrants, by relatively high population density with many duplexes and apartment houses, by comparative uniformity of occupation status, by a well developed series of conventions, by considerable "neighbouring", and by few social hazards. This is, in fact, the backbone of the modern city.

Industrial suburbs on the main routes into or out of the city come next. They are usually a mile or two out from the urban core where land values are low, where the pressure for space has relaxed, where there is plenty of room for plant layout, and where there are, however, good transportation facilities. A network of trucking roads and spur-line railways, together with loading yards, coal dumps, oil farms, storage sheds, and power houses, may be found between the several plants. A few working-men's houses exist, although usually the labour force is drawn from the low rental residential area and population does not compete with plant for the work space. However, the residential zone bulges out to fill the interstices between the major factory areas, away from the main roads.

Medium to high value residential suburbs lie on the outskirts of the built up area of the city, often off the sides of the main thoroughfares going in and out. (See Fig. 18·12.) Here there is the highest residential concentration in the city, with very few stores, banks, or similar buildings. The homes are mainly single-family homes, with a few better class apartments for young or old couples without children. (See Fig. 18·13.) They are surrounded by gardens, and so there is not really a high density of buildings or of population. The people are usually native Canadians or third generation immigrants fully integrated into the social life of the community. They are mainly business and professional people and belong to a common social status. They are fairly mobile and often leave the area when a better job offers in another city. They do not, however, change their way of life very much but manage to maintain their position because of the means and education they possess.

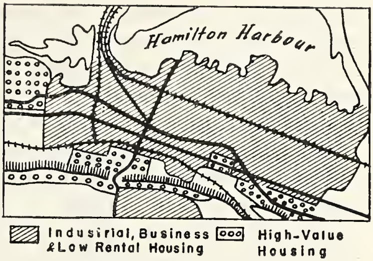


Fig. 18·12. The distribution of high-value residential areas is on the margins of the factory, shopping, densely peopled parts of the city; usually on the windward side (in Hamilton, south and west of the factories), and frequently on terraces or hill slopes (in Hamilton, on the slope and brow of the "mountain"). Almost necessarily such areas are small in comparison with the city as a whole.

They are quite conventional in certain respects such as property matters, clothes, and table manners, but may be relatively unconventional in others, as in family mores and ideas about art and religion. On the whole, they represent a fairly stable section of the community.

In recent decades, there has been a tendency to develop **urban subcentres** in or near these residential suburbs, where churches and schools have moved out from the city centre, and custom tailors, beauty specialists, doctors and dentists, drugstore owners, and the keepers of exclusive stores selling objets d'art and similar things, have settled.

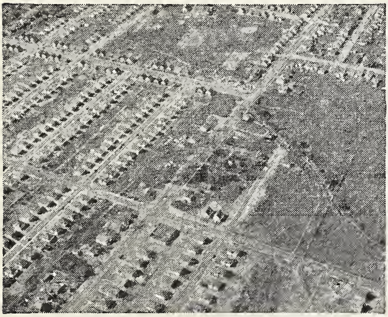


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Fig. 18·13. Single-family home of suburban surveys, Hamilton. Note the fairly wide space between the rows of houses and the lack of any commercial or industrial buildings.

A **commuter zone** finally ends the city on its outermost margins. This is an area where there is still some farmland and the city is represented mainly in **ribbon** development along the main highways or in old villages that have been transformed into **dormitory** suburbs. Here, the men are away at work all day; often the high school and college students also commute, leaving the women and children behind in a very **matriarchal** community. The women are expected to do a great deal extra in looking after the home and bringing up the children, and so they have a strong voice in family and in community affairs. Moreover they are all well educated and many of them have independent means: these things further explain their superior position in their society.

The commuter zone also contains the main golf courses, country clubs, and hunt clubs in the city, and so is the site of much of its most exclusive social entertainment and life.

Other characteristics of this zone are its low mobility—people come out to live here who can afford to, and they do not often change their jobs, much less their social status; its low population density and highly favourable living conditions, free from noise and dirt and with plenty of light and room; its independent social standards which are none the less highly responsible; the least amount of vertical expansion—there are few multiple dwellings—and the greatest amount of horizontal expansion.

It was Burgess who first called attention to the characteristically **zonal** pattern of the modern city. (See Fig. 18·14.) He and others have related the form to the social life as well as to the economic function. Thus home ownership increases steadily from the core, where it is zero, to the commuter zone. The density of resident population, very low at the core, is high in the transition belt and in the inner residential zone and thence decreases to the outskirts. The proportion of single family homes follows the same pattern. Land values are highest in the core, fairly high in the transition zone, and then they drop away considerably. Home life is least prominent in the core and transition zone, and well developed in the outer zones. The family tradition in the transition zone and low rental residential area is paternalistic, under the domination of the male. In the middle and upper class residential zone, it is much more equalitarian, where husband and wife are equals, and parents treat children as junior partners in the home. In the commuter zone, as already noted, it is markedly maternalistic.

The percentage of the foreign born in the population is highest in the transition zone, moderate in the next residential zone, and low in the outer zones. The opposite is the case with the native born population. It is conspicuous by its subordination in the transition zone but dominates in the outer zones.

The number of males far exceeds females in the core and transition zones, is somewhat higher in the working-class residential area, and tends to be a little lower, if anything, in the upper-class districts. Similarly, the percentage of the population that is married is low in the core and transitional areas, highest in the working-class zones, and moderate in the upper class regions.

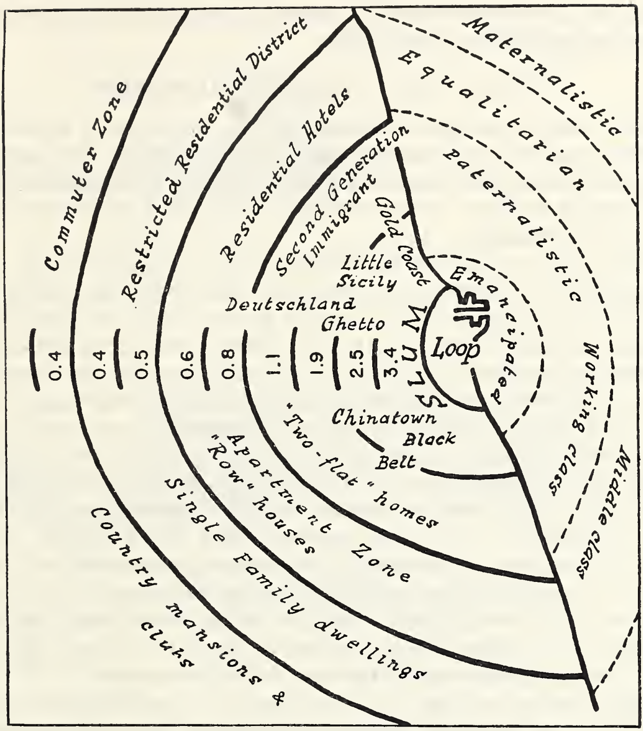

Fig. 18·14. The Burgess zones, applied to Chicago, show a remarkable tendency for a city on a flat plain to develop outwards in concentric circles. At the core is the Loop, or business area; next is the transition belt characterized by wealthy apartments (the Gold Coast) and by slums, and a high concentration of ethnic groups. The "emancipated" family is prominent. Crime rate is high (from 2·5% to 3·4% of the adult male population). The next zone, much more stable, is essentially the working-men's district with many second or third generation immigrant families. Duplexes are typical. A paternalistic family pattern dominates. The crime rate is moderate (from 1·1% to 1·9%). A third zone is much more homogeneous; native-born middle class families, living in row houses, apartments, or residential hotels, and exhibiting the equalitarian family pattern. The crime rate is low. (0·5% to 0·8%). The last zones are high class residential areas, with single-home surveys, a tendency to a maternalistic family, and practically no crime. (After Burgess, Shaw, *et al.*)

Poverty, crime, and divorce have their highest ratio, per thousand of the population, in the transition zone and then fall off sharply to the outer zone.

So it can be seen that the geographical pattern has its effect upon and is mirrored in the social pattern of the city. Geography and society are inextricably woven and merged together, the one affecting the other in a never ending series of relationships.

SOCIAL ECOLOGY AND THE URBAN PATTERN

The social forces most affecting the city are those of population pressure and the group reactions that grow up under it. Four pairs of processes develop that influence the modes of life of city people and their relationship to their surroundings—all, in fact, that we mean by the word, their **ecology.**

First there is a growing **concentration** of the population in the area favourable to the development of the city. This is felt most of all at the core and the transition zone, where the pressure from the surrounding region is immense. (See Fig. 18·15.) This is paired by a tendency for **dispersion** that is seen in the outward push of the core into the transition zone, of factories into the suburbs, and of suburbs into the countryside.

As the whole area grows, the need for **centralization** becomes increasingly obvious both to make use of the growing concentration and to guide the increasing dispersal. Centralization is most obvious at the core, where transportation, business, and administration are more and more concentrated. However, **decentralization** is also at work, where new factories may be put outside the city altogether, in a satellite village, or where sub-offices of the main stores and businesses are set up in subcentres in the outer suburbs. Branches of the various banks, libraries administrative offices and social agencies, retail stores, and other institutions thus help to spread the controls and the services.

Specialization develops with concentration and centralization. Each use of land competes with the other for available space—commerce and industry with residential areas, commerce with industry, one type of residential area with another—until at last **each finds its level.** Then the institutions with a particular use of land cluster together. In this way, they help each other. So there grow up retail areas and wholesale areas, banking areas, theatre or "white light" districts, a medical arts centre, an apartment district, and so on. **Segregation** is paired with specialization. When specialized functions arise, they tend to segregate out within the city. This segregation is not imposed: it develops from inside, from individual choice matching the economic situation. Thus there grow up segregations of different ethnic groups, occupation groups, and status groups.

Because Canadian society and economy are both so dynamic, no zone remains the same for long. **Invasion,** followed by succession, takes place. Invasion of each zone by the other constantly occurs and recurs. The commercial core invades the working-class zone, creating the zone in

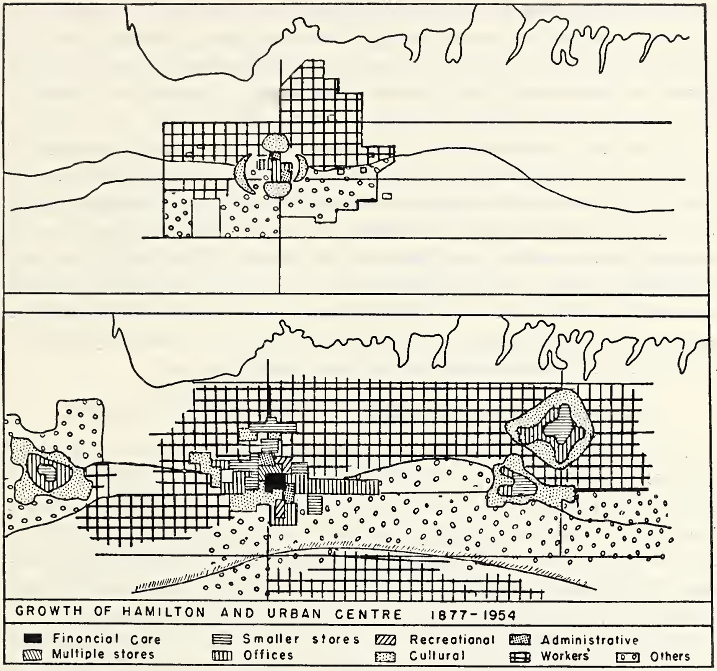

Fig. 18·15. The growing concentration of urban population, as illustrated by Hamilton, shows a gradual filling in of the whole region served by the city until about 1901, and then a marked clustering of people around the city. Eventually the rural area is permeated with the influence of the city, the pressure of population towards the centre of the city leading to an expansion of urban satellite settlements towards the margin. The concentration is still proceeding apace.

Specialization increases with growth. In early stages, the pressure on the land is scarcely sufficient to create the intense competition that leads each occupation to find its specific level and site. With growth, more functions come into play, and they have more to gain or lose in acquiring or failing to acquire the optimum site from which to carry out their activities.

transition; the inner residential zones invade the outer; these invade the rural fringe. Invasions in business and industry are followed by ethnic invasions, and these in their turn by cultural invasions. Old areas of the city are invaded by foreign-born or by offices. The old families move out. Newcomers do not readily use the churches and clubs that still remain. Eventually these move out as well. Neighbourhoods change. They decline from good residential areas with single-family dwellings owned by their occupants to tenant communities or to rooming-house communities, where houses are divided up or are replaced by apartment blocks. During the change, family ideas and class customs come into conflict, and there may be a marked deterioration in morals, with juvenile delinquency and crime. Eventually, business or industry takes over, and the neighbourhood ceases to exist.

In this case, the **succession** of one area (a business district) to another (a residential neighbourhood) has been complete. Invasion is over. A new use of land, a new type of society, a new geography has succeeded to the old. This works most completely from the centre outwards to the margin, but actually its effects are far spread. Eventually the city succeeds to what was populous country, and then the populous country succeeds to what was the pioneer zone, and then the pioneer zone succeeds to the wilderness. It is in this way that the dynamic geography of Canada is developing and the country changing.

THE STAGE OF DEVELOPMENT AND THE URBAN PATTERN

Griffith Taylor called attention to the fact that in this active, growing process there is a cycle of development (just as in the cycle of development of the physical environment itself) and he proposed that the names "youthful", "submature", and "mature" should be applied to the urban landscape as well as to the natural landscape. The way in which a city uses its site and the form that the city thus tends to take on are conditioned by the stage of development which has been reached.

When a city is **youthful**, it is small, relatively unspecialized, and undifferentiated, and the Burgess zones, if present, exist only in a most rudimentary form.

As the city becomes **submature**, it occupies more space and starts to feel the pressure on that space much more keenly. Concentration and segregation begin, and instead of one compact, undifferentiated community, a retail shopping centre, a warehouse and wholesale district, the beginnings of a factory district, and residential zones start to emerge.

In its **mature** stage, the central core becomes highly specialized; it has usually expanded well beyond the original site, at the same time expanding vertically; the zones described have become well marked; invasion is in full force: the original transition zone may have been completely succeeded to by business, and the "blighted" areas will have advanced to the old residential regions. The city will have thoroughly urbanized a wide circle of the rural landscape round about it.

GEOGRAPHY: LAND, LABOUR, LIFE

This brief description of settlement has shown that the geography of any area is a complex thing, made up of the intimate inter-relationships of the land, the way man uses it, and the social ends he has in mind. Land, labour, and life are indivisible. The land guides, suggests, influences, and, in some instances, controls. Man's labour on it is the measure of his success in learning from it, adapting himself to it, or mastering it. The life he wants to get out of it sets the stamp to its character and form.

Thus the study of geography carries one from the purely physical realm of geology and physics, from landform and climate, to the realm of living things, to plants and animals and how they adapt themselves to nature. It continues with the arrival of man and embraces the elements of freedom and of will which, through his economy and society, have moulded the earth into its present likeness:

> this corporal earth of man
> That to the imminent heaven of his high soul
> Responds with colour or with shadow.

QUESTIONS

B

1. Give a brief account of the main city types of Europe.
2. To what extent do they differ from predominant types in Canada?
3. Secure a map of your city or town, or of the nearest town. Make four tracings of it. On tracing 1 mark out the central business district. This may be identified by plotting in the main banks, insurance companies, other business offices, the principal hotels, the down-town theatres, large department stores, the city hall, the bus terminal, and possibly the railway station.
4. Where would you mark out the factory district? This should be done on tracing 2.
5. Where are the residential districts of your town? This should be shown on tracing 3, and should include only the streets that are predominantly lined with houses and apartments.
6. What are the main functional regions of the town? These will appear when tracings 1, 2 and 3 are placed on top of each other. Place tracing 4 on the very top, and copy the results of the three preceding drawings.

C

7. Write a brief geographical essay on your town, describing its chief functions, its situation and site, and its principal urban regions.

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